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Electrical West

With which is consolidated the Journal of Electricity

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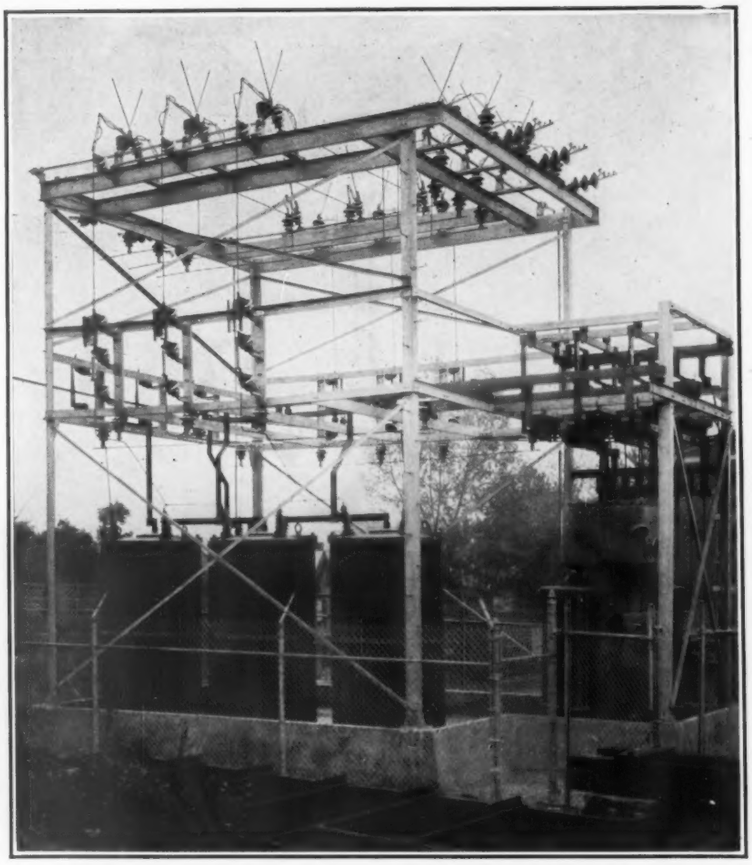

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Electrical West

With which are consodidated the "Electrical Journal," the "Journal of Electricity, Power & Gas," and the "Journal of Electricity"

C. T. HUTCHINSON, *Editorial Director*
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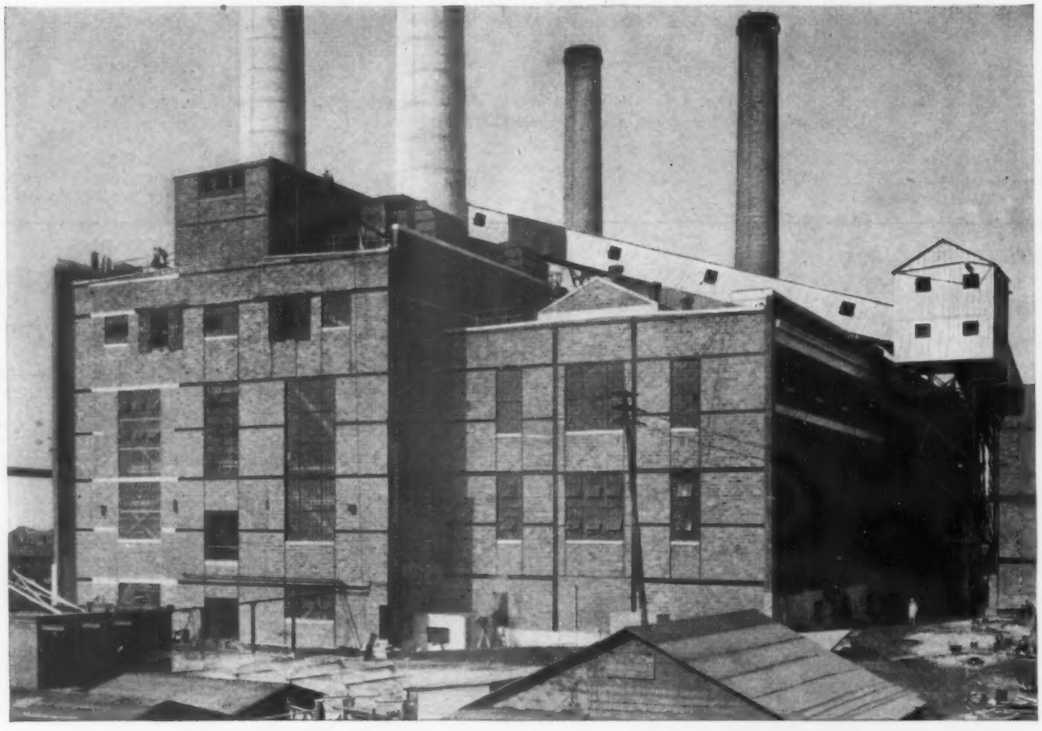

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C. T. HUTCHINSON
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G. C. TENNEY
Managing Editor

Volume 60 | San Francisco, February 1, 1928 | Number 2

Annual Stock-Taking of Performance and Prospects Points Toward Prosperous Year

ONE OF the most striking changes that has taken place in the industry within the memory of the present generation is the substitution of analysis predicated upon accurate statistical research for rule of thumb. The industrial executive of today does not set up sales quotas and determine sales policies on the basis of an arbitrary assumption of what he thinks ought to be done. He takes the statistics of production and consumption with all the various factors entering therein and then determines what he expects of his men on the basis of what can be done as reflected by a study of past performance. This is probably the highest use to which the statistics of industry can be put, for what could be a greater influence upon everybody concerned, from the highest executive to the lowest employee, than to know that his particular task is fixed through study and research and that his performance will be weighed in terms of scientifically determined criteria?

Many of the better class of industrial publications contribute much in the way of statistical study to the knowledge of the industry they serve. This issue of ELECTRICAL WEST represents an annual stock-taking, so to speak, of the performance of the electrical industry in the eleven Western states. All of the major factors that contribute to the electrical industrial structure have been studied and analyzed in so far as the year 1927 is concerned, and further such information as is available, particularly in the announcement of central station plans for load-building for 1928, is presented as well.

The value of such data to the industry coming at this time particularly can hardly be overestimated. With the central station imparting the major impulse in the form of sales stimulation, the advantage to the manufacturer, the jobber and the dealer in tying in with this impulse is obvious.

A knowledge of the fundamental facts as set forth in this issue points the way toward the achievement of more and better business in 1928 for everybody concerned. In fact it may be stated without question that there is every indication that 1928 will be the greatest electrical year in the West that the industry has ever known. With some 500,000 kva. of new installed central station power for which a market must be found, it takes no great imaginative powers to see the direction and trend of this situation. Here at least the isolated plant has practically ceased to function in any territory accessible to the power lines of the central stations. So as far as industrial development is concerned it is not so much a question as to whether or not electrical power shall be used; the problem is to get more industries into this country to use the power and to devise more means of application for electricity in industry, notably along the lines of the greater use of electric heat. The same situation applies in a large degree toward commercial development, but the greatest field of all lies in the domestic uses to which electricity may be adapted.

Westerners are a little prone to self-complacency because the application of electricity to the home is so much more highly developed in this section of the country than elsewhere in the United States. This is the wrong attitude. Even though we may admit and even prove that the West has done a better job in this respect than elsewhere, the job that has been done when compared to the job that ought to be done shows clearly enough that the surface of the domestic field has hardly been scratched. In terms of the number of wired homes we are fast approaching complete saturation, and the commercial departments of central stations that continue to express the value of their work in terms of new consumers added for the year will fall behind in the race. The real measure will be found in the increased kilowatt-hour consumption in the homes already wired.

It is no exaggeration to state that in most cases domestic consumption should be not less than five times as great as it is at present. This condition will come in the ordinary course of human events, if the members of the industry are willing to sit back and wait for their grandchildren to enjoy the blessings of complete electrical service. "Eventually, why not now?" is a better answer to this problem. That the best thinking of the leaders of industry is proceeding along the lines of the slogan of the flour that made the Gold Medal famous, is clearly indicated in the story of the commercial programs of Western power companies, as set forth elsewhere in this issue, and unless our brethren in the East work a great deal faster than they have in the past it would appear that the present disparity between domestic consumption in the Middle West and East as compared to the Pacific Coast and Rocky Mountain states will become even greater.

Business conditions in general throughout the country are sound. Attempts to resuscitate the shopworn old bugaboo with respect to the theory that years of presidential elections are periods of unrest, uncertainty and therefore hard times, meet with but little encouragement. Many years have passed since the Civil War made a division between the South and the North politically and the violent bitterness that followed that period is forgotten. Even the good old days of McKinley and Cleveland when the tariff was the football of partisan politics, have gone into the oblivion of the dead past. Nowadays one can hardly tell the difference between a

Republican and a Democrat when seen on the street. As a matter of fact, regardless of party denominations, with their traditions still clinging to them, we have but two political parties today. These consist of the party in power that desires to stay in and the party out of power that desires to get in. Local issues have a way of taking care of themselves. In the meantime, the economic condition of the country as a whole has never been more sound. We are actually not merely paying off considerable sums of our national debt, without being able to do anything spectacular in the way of collecting from our debtors, but we have reduced our income tax levies since the war period to such an extent as to have engendered envy, even hatred, in the hearts and minds of our former allies on the field of battle.

The fall elections will be of great interest beyond a doubt, while the conventions will afford a wealth of material for our political writers, and a diverting entertainment to our citizens. In the meantime the resistless tide of events will pursue its way without any perceptible slowing up; so let us unite, co-operate and co-ordinate each with the other—every branch of the electrical industry; let us not drift with the tide, but let us get behind our problems and heave all together in order that we may enjoy the fruits to which the importance and value of our industry entitle us.

Radio Used to Protect Interests of Customer-Owners

PROTECTION of the investments of stockholders is a moral obligation that has been assumed by the utilities in their customer-ownership activities. They have been particularly zealous in guarding their partners from the overtures of unscrupulous dealers in questionable securities who would trade stock certificates, whose only backing was a glowing promise of future profits, for utility shares that were as safe as money in the bank. Many methods have been devised for protecting stockholders, but the chief means employed has been to write frequent letters reminding the customer-owners of the value of their investment.

The Washington Water Power Company recently used the radio as a means of advising its customer-owners of the particularly advantageous terms of the deal for the exchange of its stock that had been made with the American Power & Light Company. The terms under which stock might be exchanged were broadcast at frequent intervals throughout the day over a Spokane station so that shareholders who might have failed to see the news in a newspaper would not sell or trade their stock for less than its true value.

Such policies as these that look toward the full protection of every partner have had much to do with the rapid rise of customer-ownership. If this attitude is continued public confidence in utility stocks cannot help but increase.

Need for Water Heater Survey Is Increasing

LACK of confidence which, in turn, is caused by a paucity of definite information regarding the methods to be employed, is retarding the development of electric water heating as a domestic load-builder. The accurate data on the characteristics of the electric range load made available by the Northwest survey have stimulated range activity in every section of the country. Electric water heating possibilities threaten to remain dormant until some such information is provided about the characteristics of this load and about the various water heating systems available.

In isolated instances water heating is receiving attention commensurate with the possibilities of the load. In other instances half-hearted efforts are being made to develop the load. In few cases are the water heating systems recommended or the methods pursued in securing the load the same.

Electric water heating will add at least 2,000 kw.-hr. per year to domestic consumption and, with the exception of air heating equipment, the water heater constitutes the largest energy consumer that can be placed in the home. Practically all of the systems now in use are satisfactory from the viewpoint of the consumer. The argument of some executives that the load is not attractive from a revenue-producing standpoint can be answered by the statement that a profitable rate can be devised for any load. All of the present objections to the load could be controverted if a survey were to be conducted.

Water heating, to be successful, must be satisfactory to the consumer both from the standpoint of service and cost; it must be profitable to the central station, and it must not have undesirable load characteristics. Certainly some of the various water heating systems in vogue today can meet all of these requirements. The problem is one of research. A fair idea of the operaiton of low-wattage heaters was gained when the electric range survey was made. A preliminary survey of the operation of high-wattage heaters was made in California last summer, but in both instances the data are insufficient to permit conclusions to be drawn.

Perhaps a manufacturer, a central station or one of the organized groups of the industry will see fit to make tests that will be conclusive. It is unfortunate that the N.E.L.A. did not appropriate funds for the completion of the survey that was to be made in California. Certainly the problem is of sufficient importance to warrant another request for financial support. In the meantime water-heater load development must suffer, and in addition the public is not receiving the benefit of one of the important and desirable services that electricity can render in the home.

The Second Labor of Hercules

THE WATER heater assumes a more important place as a load builder, refrigeration continues to hold the stage, radio battery eliminators show potentialities as load producers, and the sale of small appliances will be forwarded as never before in the 1928 commercial performance just beginning. Ranges, too, will continue in a leading role and, if anything, the field of action for this consistent performer will be enlarged.

The theme of the industry drama shows a more decided trend toward the commercial with a strong support of generating capacity in the background awaiting the tasks which commercial enterprise must make for it. The first task of Hercules has been accomplished—that of harnessing natural resources of water and oil and using them for the service of humanity. The second and no less gigantic task is the commercial task—that of finding profitable work for the available energy to do.

Altogether the commercial outlook for 1928 is one of intensive preparation and accelerated activity. Somehow even unto departments of power companies remote from the cash register the tinkle of its bell has been heralded as the music of the season. There seems to be under way a mobilization of all factors in the industry for the commercial task. The situation is without parallel in this young industry's history, but it is a situation which the more far-sighted executives have seen on the horizon for some time.

If at the end of the year all ambitions have not been gratified, or all campaigns carried to successful termination, if all branches of the industry have not participated, certainly it will not be for lack of opportunity. The measure of accomplishment, however, will depend greatly upon how well all factors enter into the movement. Commercial advancement, upon which the future of all engineering and other achievements must depend, looms, therefore, as the most important objective for 1928. The responsibility rests upon all branches, all phases of this ramified and extensive industry.

Scholastic Interest Turns to Lighting

CONSERVATIVE to a fault, as a general rule, are the universities and colleges. Therefore the introduction of a new subject into the curriculum of such an institution may be taken as an index of the degree of acceptance to which that subject has attained, especially if the subject be one connected with engineering or science.

Lighting men, then, should feel reassured by the interest which a number of Western universities have shown in illumination in the recent few months. They should find greater comfort in the fact that for instructors in illumination these institutions have come to men in the electrical industry, illuminating engineers of practical experience and broad knowledge.

Lighting schools, or classes, of the popular and practical type, for instance, recently have been conducted at Pomona College by Clark Baker of the National Lamp Works. California Institute of Technology has asked that similar short lectures on practical illumination be given to classes of that institution by Mr. Baker.

At Stanford University, under the tutelage of Leo Gianini, illuminating engineer of the Edison Lamp Works, a full-credit course is being given in illuminating engineering. This course, too, is being handled from its practical aspects by Mr. Gianini and has proved itself to the point of insistent requests for its continuance.

Lighting as an art and as a means of improving the civilization of the future stands a much better chance of receiving intelligent treatment and application when the universities and colleges thus give serious and practical consideration to the important subject of illumination.

Engineers Are Setting the Pace

WITH attention focused upon vital and practical operating problems, the solution of which will mean still greater efficiency in the generation, transmission and distribution of electrical energy, the Engineering Section seems to have established itself as the pacesetter of the Pacific Coast Electrical Association. Among the subjects that are under analytical study are refinements in design of plants and equipment, refinements in operating practice, and many field experiments with new apparatus. These studies are not academic in nature but are based upon running investigations and analyses which will further increase the productivity of every dollar invested.

Credit is due the Engineering Section for the scope and practical importance of the subjects under study by its various committees. No better proof of this is needed than a visit to the recent group meetings held in San Francisco. Attendance at all sessions was notably heavy and a lively interest was evidenced by wide participation in the discussions.

With the challenge before them to produce more kilowatt-hours per dollar of invested capital, the engineers have set out to install more kilowatts of plant capacity per invested dollar and also to obtain more kilowatt-hours per kilowatt of installed plant capacity. Thus the section is contributing to the improvement of electric service and the reduction in production costs and is paving the way for a greater and greater commercial activity in the sale of kilowatt-hours.

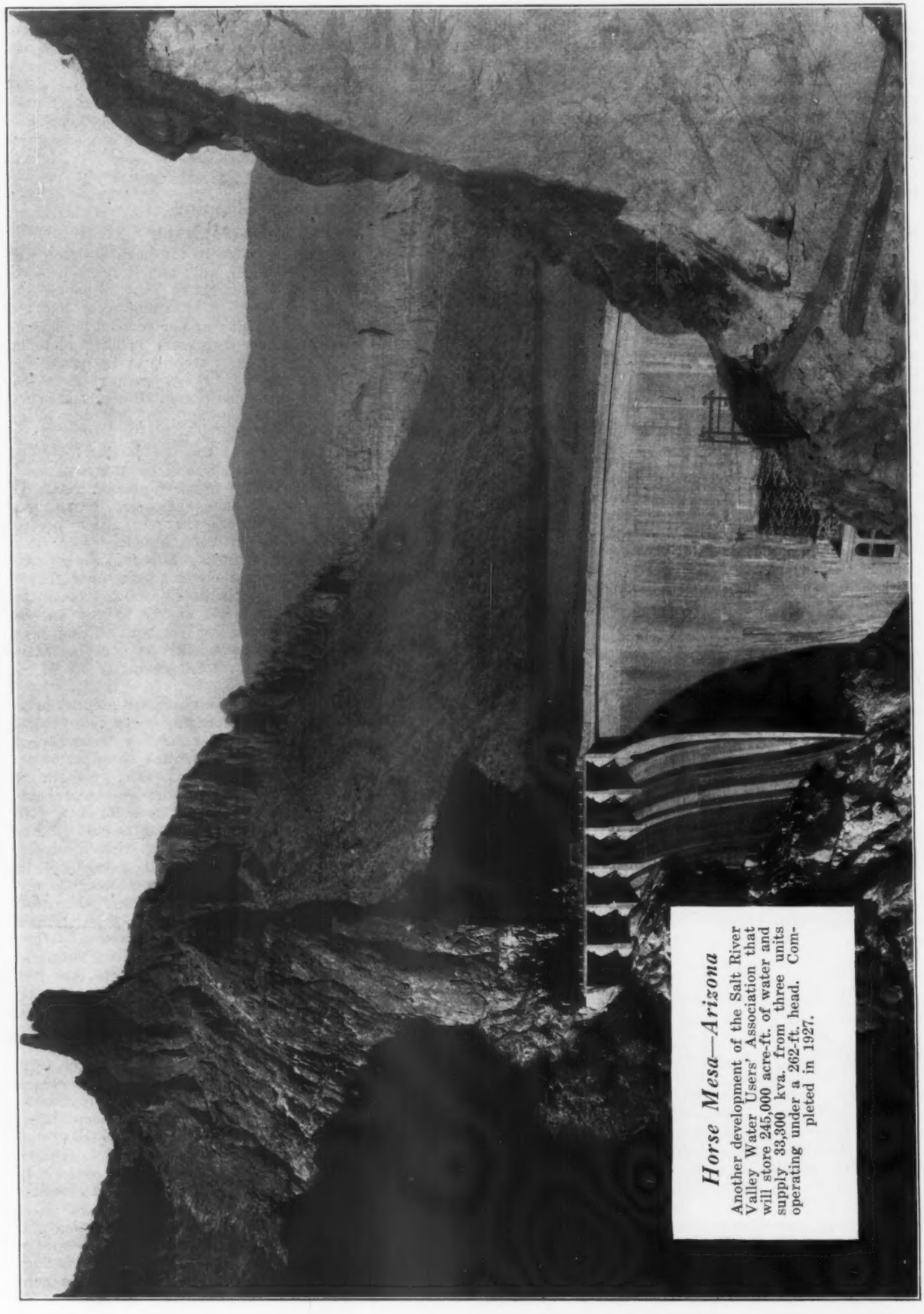
Not Spring House-Cleaning But Spring House-Wiring

SPRING construction work in the home-building districts soon will be under way, and it is in order to remind everyone in the industry that although the noise that marks the opening of a movement like the Red Seal Plan for the raising of home-wiring standards long since has died down, permanent results are to be obtained only by everlastingly keeping at the promotion of the idea, not so much by skyrocket methods as by talking the Red Seal specifications on all occasions when home-wiring is under discussion. In this way every man in the industry can help.

The movement to promote the use of the Red Seal specifications for home-wiring, and by this to secure greater adequacy of wiring to meet present needs, is in no sense a drive. It is a long campaign. It will take several years more to obtain the recognition needed for the general adoption of these standards, but this recognition is of such immense importance that the effort needed now to promote the idea looks insignificant when compared with the ultimate results and should be limited only by the industry's ability to pay in the shape of time and effort of its members. Every man who puts effort into this movement now is laying some of the foundations of his future prosperity if he remains in the electrical business.

We have in the results of the convenience outlet campaign in California an encouraging example of what can be done, and it is well to remember these results when temporarily discouraged over the slowness of results in the Red Seal wiring plan. The co-operative movement to increase the number of convenience outlets in California homes got under way in 1919. No complete statistics ever have been or can be published as to the revolution in home-wiring that this campaign brought about. Some small things, however, can be taken as showing which way the wind blows. In one of the smaller cities on San Francisco Bay, when that campaign started, a small cottage plan which called for more than one convenience outlet was a rarity. Even as late as 1921 plans as submitted to the electrical contractors showed little effect of the efforts that had been made to put over the idea with the public. In the last two years in that same city one or more convenience outlets in every room has been the rule, except in the very smallest and cheapest homes, and even in the latter class statistics of twenty-seven cottages wired in 1926 and 1927 showed an average of about six convenience outlets per cottage, the lighting outlets averaging about fifteen. Electrical inspection departments of some cities, as a result of the increasingly favorable sentiment for the convenience outlet, have been encouraged to require these outlets in certain rooms where a fire hazard is sure to be introduced by the attachment of heating appliances to lamp sockets.

After all, the Red Seal wiring campaign is but the logical outgrowth and broadening of the convenience outlet campaign. The success of one is a sure indication of the success of the other, provided every man in the industry broadcasts the Red Seal message.



Horse Mesa—Arizona

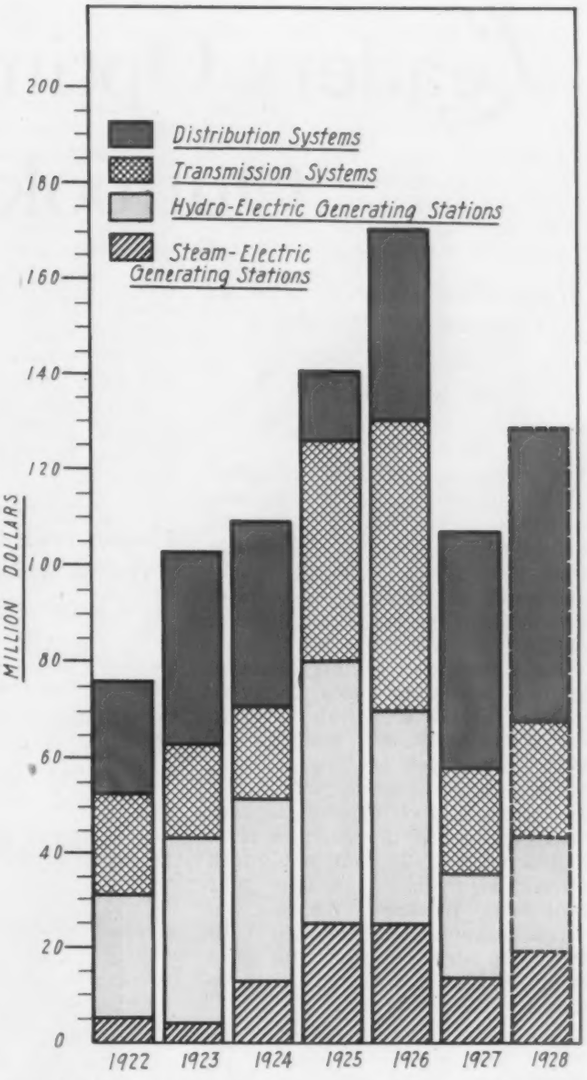
Another development of the Salt River Valley Water Users' Association that will store 245,000 acre-ft. of water and supply 33,300 kva. from three units operating under a 262-ft. head. Completed in 1927.

1927 in Retrospect and a Forecast for 1928

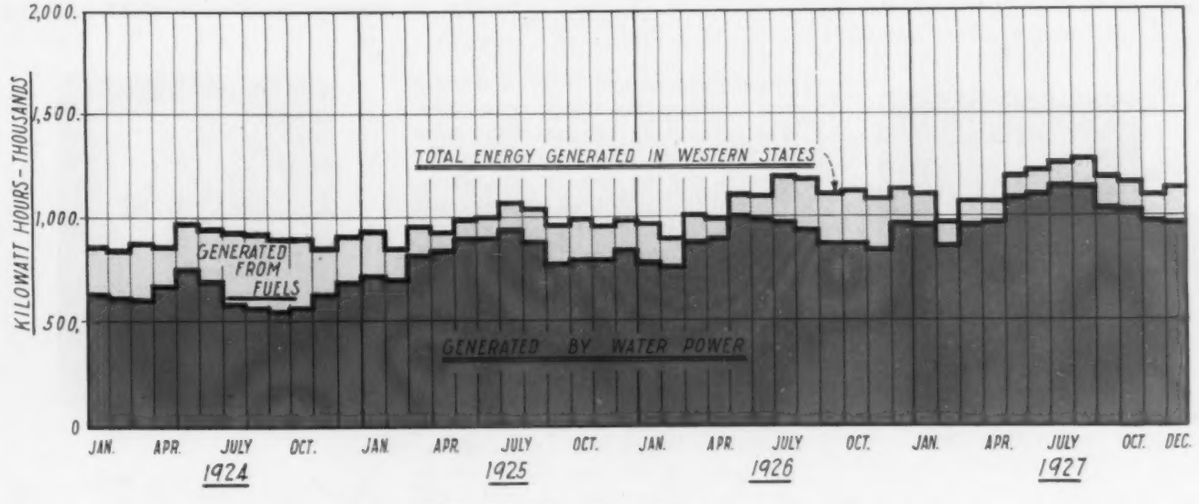
ANOTHER chapter has been written in the history of the electrical industry of the eleven Western states. The following pages record the principal achievements of 1927 and present in brief outline the program for 1928. During the year just closed the 2,875,940 customers of the central stations used 13,726,565,000 kw.-hr. for which they paid $214,700,000. Water power continues to be the chief source of electric energy, 89.5 per cent of the total generation having been produced in hydro-electric plants. Per capita generation showed a satisfactory increase in practically every state.

But 1927 is now history and the principal concern is in what the coming year holds. New capacity to be added will exceed the record of any previous year with 520,000 kva. to come on the lines. With such a supply of goods on the shelves it is only natural that ambitious commercial programs should be undertaken. One needs only to study the review of sales prospects to see that 1928 will be a commercial year. Added impetus will be given to sales work by the establishment in a number of territories of reduced inducement-type rates. To load existing facilities to the utmost and to further the use of electricity in the home, in the store and in industry will be the slogan for 1928.

Competition for the consumer's dollar is becoming keener every year. During 1928 the electrical industry plans to make a determined effort to get its share. It is offering the greatest bargain in the world.



Central station expenditures for generating plants and transmission and distribution systems, 1922-1928, for the eleven Western states.



Energy generation for the eleven Western states 1924-1927.

Leaders Optimistic Regarding Outlook for 1928

Many New Records Can Be Created in 1928 by a United Industry

By W. L. FROST
President, Pacific Coast Electrical Association.

WITH two premises—a united industry and a willing public—it is obvious to me that 1928 will be a banner year, provided only that the united industry intelligently plans its operations to meet the greatest needs of the willing public.

As a first step in this direction let me repeat my plea to every member of the electrical industry:

"If you would sell more ranges be sure that you use one yourself. If you would interest your fellow merchants in good lighting, be sure that you have it in your own store and windows. If you would sell electric signs, have one over your own door. Whatever it is that you would have others do with electricity be sure that your own operations in similar directions are electrical. Use it yourself!"

The stage is set for the breaking of records in 1928. The West is prosperous. Snow and rain have been plentiful enough to fill the reservoirs. Steam plants are being added every day to give a better balance of power. Crops will be good. Factories are busy and there will be money available to buy our goods and our services if we will only show the public, first that we believe in these devices so well ourselves that we use them at home, and then what they should have and how these devices and services fit into their own lives.

An aggressive, united industry, working intelligently, should ring the cash register every day of the new year.

W. L. FROST

Commercial Men Must Grasp Opportunities to Build Faster Than Normal

By A. C. McMICKEN
President, Northwest Electric Light and Power Association.

THE electric utilities in Oregon, Washington, Idaho, Montana, and Utah have enjoyed a steady growth throughout 1927 and have full confidence in the year to come. The increase in kilowatt-hour sales to consumers has been above the average for the country as a whole. The utilities have kept pace steadily with the demand for power and for service. I am proud to say that every company that is a member of the Northwest Electric Light & Power Association has maintained and is maintaining facilities ample at all times to meet the public demand in spite of the statement of public ownership demagogues to the contrary. There are no clouds on the political horizon and there is every indication that the public will continue to vote sanely on matters relating to public and municipal ownership. I know that as utility operators, from the humblest employee up, we are trying hard to enjoy and deserve the confidence which the public is placing in us. By telling our story, first to the employees and then to the public, we are cementing this friendship for the years to come.

The year to come promises much from a load-building standpoint. The public interest in the electric range and water heater in this territory should result in even greater sales than during the year just closed. Industrial heating, further electrification of the lumber and paper industry, street and highway lighting, heavy duty hotel, restaurant and bakery fields, all offer possibilities for the commercial man to increase the growth of his company faster than the normal rate. In fact opportunities exist for all branches of the industry if they will but capitalize them.

A. C. McMICKEN

Correlation of Activities and Co-operation Mean Great Progress for Industry

By CLARE N. STANNARD
President, Rocky Mountain Division, National Electric Light Association.

CONTINUED growth in all branches of the electrical industry along well established and proved lines is assured. In Colorado we anticipate an event of considerable significance from the stand-

CLARE N. STANNARD

point of national interest as well as of local industrial growth. This will be the opening of the Moffat Tunnel to transcontinental railway travel. The event will celebrate an engineering accomplishment of real significance.

From the standpoint of local industrial growth the opening of this tunnel is of great significance due to the anticipated increased tourist travel and the opening of wide stretches of rich agricultural and mineral lands in northwestern Colorado. In this increased industrial growth and general prosperity the electrical industry will participate.

The year 1928 holds prospect of a considerable increase of interconnection of important points in the Rocky Mountain states. Present transmission lines of Colorado may be connected to points in Wyoming. Similarly these same central systems will eventually be extended south to reach present interconnections extending practically to the New Mexico line. The electrical industry in our region has been developing a slendid spirit of cooperation through its established association activities and also through those correlated agencies being directed through our Committee on Public Utility Information and the Colorado Electrical League.

Recognition of Obligation Is Essential for Prosperity of Contractor-Dealers

By C. L. CHAMBLIN

President, Association of Electragists, International.

I have been asked for my impressions on the outlook for my organization for the coming year in this territory. I do not wish to be pessimistic, but I do not look for any marked change in the situation for the coming year. Power company sales campaigns will probably be the greatest in the history of the business, and building will be as heavy as can be considered normal, but with it all comparatively few contractor-dealers will show a normal profit at the end of the year unless there is a tremendous awakening, both within and without our organization. Within the organization must come the realization that every sale and every job must carry its proper mark-up on cost, based on actual figures and not on theory. Large volume can be obtained only at the expense of legitimate profit, with rare exceptions. Without the organization must come an awakening to the realization that a large number of irresponsible retail outlets will retard rather than build up public confidence in the electrical industry. By irresponsible I do not mean in the financial sense only, but also irresponsible to the obligations they owe to the industry from which they are gaining their livelihood.

C. L. CHAMBLIN

If "so-called" Electragists will become real Electragists in all that the appellation stands for, and the rest of the industry lend its unreserved support to this type only, 1928 will be the banner year of all time. If, on the other hand, each individual and each branch of our great industry is motivated by selfish and greedy purposes only, then December of 1928 will find each one of us with a few more gray hairs, little if any more provision made for the future, and a weakening of our confidence in each other, with a corresponding weakening of public confidence and acceptance of our merchandise: namely, current and current consuming devices and apparatus.

Adequate Service in Every Home Should Be Goal of Electrical Industry

By C. T. HUTCHINSON

Chairman, Advisory Committee, California Electrical Bureau.

DURING 1927 the activities of the California Electrical Bureau were conducted along two distinct lines. The first of these consisted in strengthening the district organization of the bureau, cementing more firmly its relationship with the California Electragists, conducting through the Electragists an educational campaign among the contractors for the institution of better accounting, estimating and merchandising methods. The second phase of the work of the bureau has been the promotion of the Red Seal Plan.

In promotional work of this nature predicated upon the desirability of building higher standards of adequacy in domestic house wiring, the effect is always cumulative provided that it is followed through vigorously. Figures compiled for the first nine months of 1927 show an increase of 21 per cent in the number of Red Seal applications in California in spite of a general decrease in residence building for the same period of 16 per cent. These figures cannot do other than show a satisfactory condition, with the further possibility that as the industry and the general public become better informed as to the utility of adequate house wiring, better and better results may be expected.

C. T. HUTCHINSON

For 1928 the bureau proposes to continue both of the above named activities as vigorously as its resources will permit, and the advisory committee looks forward to a constant improvement in the development of the art, and especially toward the extension of the blessings of electrical service in the home.

Industry Must Advertise Desirability of All Appliances

By R. M. BLEAK

President, Electrical League of Utah.

DURING the past year a number of worth while activities on the part of the Electrical League of Utah have been followed, including advertising, special displays and exhibits at state fairs and elsewhere, to help promote the sale and use of electrical devices. Probably the outstanding activity and the one which the league pledged itself to follow through was in connection with new ordinances required to improve electric wiring conditions in Salt Lake

City. One of the important provisions of the new ordinance is the requiring of a bond guaranteeing both the customer and the city against fraud or negligence on the part of an electrical contractor, which provision we feel will increase materially the standards of wiring. Any violation of good practice subjects the contractor to the possibility of revocation of his license.

Nineteen hundred twenty-eight looks very promising for a most

R. M. BLEAK

active year for our league. One of our principal ambitions is to be sure that the provisions of the new ordinance are enforced and we are anticipating a splendid improvement in wiring conditions as a result. We are establishing a course of weekly lectures in non-technical language to which all members of the industry are invited. Interest already shown in these lectures indicates that this program is destined to improve our working knowledge of the business we are in during the year. While we have made no definite plans for a publicity and advertising program for this year, we expect to carry on in a greater degree than ever before the story of the desirability of electrical appliances in the home and close the year with another big drive on the Christmas lighting idea, which is already exceptionally well established in Salt Lake City.

Domestic Load-Building to Dominate Intermountain Sales Activities

By F. F. McCAMMON
Chairman, Advisory Committee, Electrical League of Colorado.

THE electrical trade outlook in the area comprising the States of Colorado, Wyoming and New Mexico for the year 1928 reflects a view of optimism. This territory, widely scattered, with an average population density of 7.5 per sq. mile, has always forced intensive commercial effort on the part of utilities for load development. That effort has been directed during the past year towards the exploitation of load-building devices, and the electric range and refrigerator in the domestic field now occupy the dominant interest of practically all the larger companies. The acceptance of the electric range as a desirable load-builder is complete and uncompromising and intense effort will be put behind it.

Industrial conditions are highly diversified in the fields of metal and coal mining, oil production, general manufacturing and agriculture, and because of this diversity and balance general business conditions are not seriously affected by cyclic changes in any one field. Agricultural conditions are generally good, and manufacturing has shown substantial increases, though metal mining and oil production have suffered through depressed market prices and coal mining has had another outbreak of labor troubles. Power load growth with attendant benefits can be reasonably expected to continue.

As in all parts of the country, the limitations of domestic growth in this territory lie in that serious

F. F. McCAMMON

handicap of inadequate wiring installations in the home and through unremitting educational efforts of the Electrical League of Colorado, individual and co-operative efforts of contractor-dealers, central stations, jobbers and manufacturers, notable progress has been made. General trade conditions in the electrical industry in this territory should be favorable during the coming year. The commercial department program of the central stations will contribute much to the prosperity of the industry.

Readjustment During 1927 Gives Jobbers a Better Outlook for 1928

By H. L. HARPER
Chairman, Pacific Division, Electrical Supply Jobbers' Association.

I regret that I am not in a position to express an opinion as to the business outlook for the coming year for the membership of the Pacific Division of the Electrical

H. L. HARPER

Supply Jobbers' Association, which is occasioned by my not being in possession of the consolidated views of all of our members. I am therefore only able to give our own individual impression of the situation in southern California as we view it.

Business in southern California during 1927 should be viewed from two angles—volume of business and net profits made. Speaking generally, it has been our observation that volume closely paralleled 1926 but in many instances net earnings were not as satisfactory. Business is fast approaching a state of normal, and to those firms who had an appreciation of the changing economic conditions and adjusted their operations accordingly through effecting economies in operation instead of depending upon increased business to care for high operating expenses, a satisfactory net profit resulted. In many instances this has not been done, with the result that several lines of business, in practically all classes of industry, failed to make a satisfactory earning on the capital invested. In some lines of industry there have been too many firms engaged in the business.

Conditions point to a good 1928 and we approach it with confidence, being of the opinion that as the year progresses business will improve, and that for those firms who operate on an efficient basis a satisfactory net result will ensue.

1928 Merchandising Opportunities

LOAD-BUILDING and merchandising programs in the eleven Western states during 1928 as announced by the various central stations and co-operative organizations lead to the prediction that this will be a banner year for the sale of appliances, merchandise, and lighting equipment. The following figures are based upon a study of the reports sent in from every section of the West. During the year present and new consumers will purchase approximately $50,000,000 in new appliances from the various outlets.

$9,000,000
Lamps

$8,500,000
Washers

$8,500,000
Ranges

$6,000,000
Refrigerators

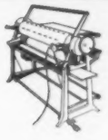
$5,500,000
Convenience Outlet Appliances

$5,000,000
Fixtures

$3,750,000
Cleaners

$3,000,000
Water Heaters, Air Heaters and Miscl.

$750,000
Ironers



Grand total - - - - - - $50,000,000

Commercial Departments Take

TO MEET the callenge which increased generation facilities lay down commercial executives outline their plans of camaign for 1928.

RECOGNITION has come to the commercial aspects of the electric light and power business. If there were any doubt about it the tremendous contemplated generating capacity for the coming year or two, given in evidence in other pages of this issue, would scarcely have been undertaken even by the most sanguine of engineering executives.

It is as though the plea of the commercial man for executive recognition and support had been met with a challenge to even greater responsibility. "You ask for a place in the sun," the challenge seems to imply. "Here then is an opportunity such as has never before been yours."

Thus the program for the next few years of added generating equipment, transmission facilities and means and methods for delivering service to the public is set in motion. Whether such an intent has been a real one or not the implication made by the facts themselves is sufficiently challenging to the commercial departments of Western companies.

Power companies of the West will have in excess of 600,000 hp. of energy upon their shelves to sell to the public. A sensitiveness to the wants of the public and an imagination and an iniative which will convert that horsepower into the means of doing the tasks which the public wish done will be needed in one of the greatest selling jobs ever turned over to commercial men to do.

How, then, is the task organized? What are the individual commercial departments doing to face their new and enlarged tasks?

Annually ELECTRICAL WEST, in order to reflect accurately the pulse of the industry, calls the roll of commercial executives and asks of them a number of pertinent, oftentimes impertinent, and always personal, business questions.

Every year commercial executives respond with facts and figures, details of plans and programs which not only do credit to their organizations but which are a measure of their confidence in the soundness of their commercial undertakings.

Taken alphabetically the statements of power companies as to commercial incentives for 1928 will be found of individual interest. A summary of the specific data as to ranges, water heaters and refrigerators will be found in the accompanying table. Together or as to individual units there will be found in each frank statement much of genuine interest to any one engaged in the electrical industry.

VICTORIA TO STAGE ELECTRICAL HOME

Showing substantial increases in industrial and residential loads the British Columbia Electric Railway Company, Ltd., of Victoria, B. C., looks forward to increased business during 1928. S. J. Halls, manager of the light and power department, Victoria, says in detail:

During the year 1927 the company added 602 lighting consumers to its Victoria system, making a total of 18,018 connected. The increase in lighting load was 1,500 kw., making a total of 15,702 kw.

There was added 2,078 hp. during the year to the commercial power circuits, giving the company a total of 34,057 hp. of motors connected on Vancouver Island. The largest individual installation was a 600 hp. motor on a ground wood pulp plant, this being the first unit of what ultimately promises to develop into an industry of considerable proportions.

The merchandising department has conducted campaigns on the various larger appliances during the year with gratifying results and business conditions generally with the trade as a whole have been good with the outlook very encouraging for 1928.

The electrical interests of Victoria will stage an electrical home exhibit during the month of February, and this effort will serve as a practical example of an average sized home properly and artistically illuminated and wired for electrical labor saving devices, radio, etc.

The following figures apply to the company's Vancouver Island branch:

Ranges added to system in 1927.....113
Quota for 1928 150
Water heaters added in 1927..... 75
Quota for 1928 100

Refrigeration —

Domestic installations in 1927..... 70
Commercial installations in 1927..... 67
Quota for 1928 150

The average kw.-hr. consumption of domestic consumers was 660 during 1927, an increase of 120 over 1926.

Average revenue per domestic consumer was $35.10 in 1927, as compared with $32.40 in 1926.

The company reduced its lighting and power rates on January 1, 1928. These revised schedules will result in a reduction of approximately $150,000 per annum covering the Victoria branch.

Range, Water Heater and Refrigerator Sales, 1927, and Quotas for 1928

Company	Ranges 1927	Ranges 1928	Water Heaters 1927	Water Heaters 1928	Refrigerators 1927	Refrigerators 1928
B. C. Electric Railway Co., Ltd., Victoria	113	150	75	100	137	150
B. C. Electric Railway Co., Ltd., Vancouver	872	1,200	506	600	19	.....
California Oregon Power Co.	523	625	378	450	200	250
Central Arizona Light & Power Co.	435	800	100	200	225	500
City of Seattle	3,552	3,800	1,000	1,200	5,000*	.....
City of Tacoma	840	.....	800	.....	.....	.....
Coast Counties Gas & Electric Co.	176	.....	81	.....	71	.....
Great Western Power Co.	1,200	1,800	400	750	1,500	.....
Idaho Power Company	1,441	1,500	500	.....	.....	.....
L. A. Gas & Electric Co.	128	.....	.....	.....	.....	.....
Northwestern Electric Co.	1,392	1,800	230	500	700	.....
Pacific Gas and Electric Co.	3,500	4,700	1,500	2,400	9,000*	12,000
Pacific Power & Light Co.	655	750	409	500	88	250
Portland Electric Power Co.	2,200	2,500	700	1,000	244	.....
Puget Sound Power & Light Co.	8,000	10,000	1,700	.....	300	1,800
San Diego Consolidated Gas & Electric Co.	400	600	238	300	925*	.....
San Joaquin Light & Power Corp.	1,058	1,250	701	925	800	2,000
Southern California Edison Co.	3,000	5,000	1,150	2,000	.....	1,000
Southern Colorado Power Co.	689	800	22	75	39	130
Southern Sierras Power Co.	500	.....	200	.....	200	.....
Truckee River Power Co.	77	100	16	50	22	130
Utah Power & Light Co.	2,031 600*	2,500	150	.....	240	500
Washington Water Power Co.	1,124 200*	1,000	1,084	900	.....	.....
Western Colorado Power Co.	120	100	60	50	70 20*	75

*Dealer sales.

ELECTRIC FIREPLACES POPULAR

That the electric fireplace heater hakes an ideal combination with the electric range has proved the experience of the British Columbia Electric Railway Company, Ltd., at Vancouver, B. C., according to Edmund E. Walker, sales engineer for that company. Other commercial enterprises of the company are detailed in his letter, which follows in part:

During the year 1927 special campaigns were conducted

Up the Gauntlet

by our merchandise department on the following appliances: ranges—Hotpoint, Moffat and Westinghouse; suction cleaners—Hoover and Royal; floor polishers, washers, toasters, waffle irons, percolators, cookers and ironers.
The results of some of these campaigns were as follows:

Appliance	Period of Campaign	Quota	Sold
Floor polishers	January	200	215
Floor polishers	November and December	200	225
Cleaners	March	200	233
Toasters	March 15-April 15	500	507
Ranges	April 15-May 15	200	221

The following table indicates our sales of major appliances during the past year:

Appliances	Sales 1927
Ranges	872
Water heaters	506
Fireplaces	139
Washers	667
Floor polishers	587
Ironers	56
Irons	2,379
Toasters	1,591
Waffle irons	250
Percolators	485

Total connected load of appliances sold in 1927 was 12,067.46 kw.
Our quota of range sales for 1928 is set at 1,200 and our water-heater quota for the coming year is 600.

As I have stated, complete details of our year's activities are not yet available, but indications are that in greater Vancouver an increase of 13 per cent will be shown per domestic customer. The number of domestic customers has increased approximately 12 per cent during the past year.
The Electric Service League of B.C. has been active during the past year in encouraging the building of Red Seal homes, and has also done good work in stimulating better commercial lighting.
Our company has made reductions in commercial and residential lighting rates effective from the first of January, 1928, and it is expected that this factor will stimulate materially the electrical industry during the present year. Our company is prepared to capitalize on these reduced rates to the fullest extent, and has several special campaigns lined up at the moment. On Jan. 9 we commenced a better lighting campaign among our commercial customers, which will be carried on for approximately one month. Our quota for this campaign is 1,000 Brite Lite units.
Our company merchandised only nineteen refrigerators during 1927, and we have not the figures available showing the total sales of refrigerators. In this territory several apartment blocks were completely equipped. Electric fireplaces proved very popular, and an increase of 1,200 per cent was shown in our sales of these appliances. Apartment blocks are finding that the electric range and the electric fireplace make an excellent combination, and we are looking forward to a big demand from this field.

Developing Spray Plants

William Shepard, vice-president and general agent, The California Oregon Power Company, Medford, Ore., in detailing the activities of that company describes a new type of load which is being developed in the territory served by his company. He says in part:

About the only type of new load which we have undertaken to develop during the year has been that of stationary spraying plants for fruit orchards. The Rogue River Valley has many pear and apple orchards in which the stationary spraying system could be applied and we feel that a desirable load for our rural distribution lines may be built up by the installation of these systems.
The growth in our average domestic consumption is shown by the figures of 1,202 kw.-hr. per domestic consumer for 1926, which was increased to 1,415 kw.-hr. per domestic consumer for 1927. These amounts include estimated kilowatt-hour consumption of domestic flat rate water heaters.
Data on our commercial and load building activities during 1927 I am submitting in a tabulation showing increases in the number of consumers and connected load for different classes of customers.

	Number of Customers			Connected Load—kw.		
	Nov. 30 1926	Nov. 30 1927	Inc.	Nov. 30 1926	Nov. 30 1927	Inc.
Residential	14,576	15,403	827	28,430	32,990	4,560
Commercial lighting	3,325	3,484	159	7,073	7,000	**73**
Industrial power	827	918	91	38,824	38,027	**797**
	18,728	19,805	1,077	74,327	78,017	3,690

Bold face figures indicate decrease.

Regarding our merchandising activities, 1927 has witnessed much work on our part, which has been that of establishing ourselves in the merchandising business and getting our various stores opened. At the present time we have standard Byllesby merchandising stores in operation in Roseburg and Grants Pass, Ore., and in Dunsmuir, Calif., with branch stores or salesmen and display rooms in Chiloquin, Klamath Falls and Glendale, Ore., and Weed, Calif. The store in Dunsmuir was the first to be opened in Dec., 1926, and the Grants Pass store, in an entirely new building, the last one to be put in operation in Dec., 1928.
No special intensive campaigns were put on this past year because of our activities in getting into operation and opening stores, but several cooking schools and range demonstrations were provided for the public in those towns in which we are merchandising. These of course stimulated the sale of ranges and appliances but to just what extent we do not know as we have no accurate figures. No particularly large or spectacular loads were signed during the year.
The status of the electrical trade in general in our territory is very good. Now that we have our stores all established we expect to do more than twice the business which we did in 1927 and we feel sure that we can easily make this quota. The live contractor-dealers in our territory did a very good business during the past year, probably the best in their history, and the outlook for 1928 is that they will do an equal amount, if not more.
Our plans for 1928 along merchandising lines are to push the sale of ranges, refrigerators and domestic appliances; in short, to attempt to increase our domestic consumption and revenue. As to results and quotas we estimate as follows:

Number of electric ranges added to system in 1927	523
Quota for 1928	625
Number of electric water heaters added to our system in 1927	378
Quota for 1928	450
Number of refrigerators sold in our territory by ourselves and contractor-dealers together in 1927	200
Estimated quota for 1928	250

Women's Club Lectures

"To further the use of electric appliances, and particularly electric ranges, a series of home economics lectures will be given this month under the auspices of the Central Arizona Federation of Women's Clubs. The plan will include 21 of the 23 women's clubs in the Salt River Valley. Through this and other plans we expect to more than double electric range sales this

year. We plan to keep up a concentrated sales effort on small appliances throughout the year," says A. F. Morairty, general sales manager, Central Arizona Light & Power Company, Phoenix, and then continues with information regarding the commercial activities of his company as follows:

Our records show:

An increase in 1927 over the previous year of 1,539 consumers. This includes both business and residential electric consumers.

An increase of approximately 4,151 kw. of connected load.

An increase in domestic electric range and lighting of 38.9 per cent in kw.-hr. consumption.

There were 435 electric ranges and approximately 100 water heaters added to our lines in 1927. With new territory opening up, this figure should be nearly doubled this year.

Estimated refrigerator sales for this territory were 225. Due to the increased public interest in electric refrigeration, this year should see this number more than doubled.

An interesting feature of our activities during the past year, and one that tells the story more clearly is the annual average kw.-hr. increase per consumer. Our records show the annual average kw.-hr. consumption for 10,000 domestic consumers on our lines on Nov. 31, 1926, to be 347 kw-hr. This included electric ranges and lighting. Nov. 31, 1927, showed the annual kw.-hr. consumption to be 445 kw.-hr. per consumer, an increase of 98 kw.-hr. Of the 10,000 consumers, 1,800 live in the electric range district and use electric ranges or kerosene and wood stoves. The other 8,200 live in the gas district and use gas for cooking.

In answer to a question as to whether or not the 1,800 consumers in the electric range district were responsible for the kw.-hr. consumption per consumer increase, a recent survey was made which showed that the 1,800 consumers in this district were using an annual average of 697 kw.-hr. per consumer. About one-fifth of these consumers use electric ranges.

The annual average kw.-hr. consumption per consumer for the remaining 8,200 consumers who are in the gas district is 400 kw.-hr. Again the question was asked: What was responsible for the 8,200 consumers who cooked with gas having an average consumption of 400 kw.-hr. per consumer? It was due to extensive campaigning throughout the year of small electric appliances such as percolators, toasters, waffle irons and Mazda lamps, also to extensive sales department and employee co-operation. All the figures used in the above report are as of Nov. 31, 1927.

Pay Special Attention to Training

Convinced of the necessity for well trained salesmen, the Coast Counties Gas & Electric Company plans to pay particular attention to this phase of activity during 1928 in connection with its enlarged sales plan, according to Morris F. Wales, general agent, San Francisco. Mr. Wales describes his company's sales ambitions in the following manner:

Our main effort was devoted to the training and education of salesmen and other employees, and rebuilding some district offices properly to display merchandise, so that our commercial efforts would produce the largest amount of sales for every dollar spent on new business. We now have a well organized sales department operated by trained, competent men and look forward to a much larger business for 1928.

As of Dec. 31, 1927, we had 16,684 electric customers, an increase of 6 per cent over 1926.

During the year we sold among other electric appliances:

176 Ranges
81 Water heaters
29 Air heaters
223 Kitchen lighting units
93 Commercial lighting units
50 Household Frigidaires
21 Commercial Frigidaires
256 Toastmasters
361 Everhot cookers

and a number of floor and table lamps, heating pads, Mazda lamps, etc.

A few of the most interesting sales efforts were: the introduction of Toastmasters, sold on terms during the month of March, during which we gave all employees a commission and sold 225; the introduction and sale of Everhot cookers during June, when we sold over 325 practically by advertising alone; the sale of 76 electric ranges in February by giving a 10 per cent reduction, one salesman alone selling 26; and a Mazda lamp campaign during December, all employees being given a chance to sell on commission, which was very successful.

While the sale of Frigidaires was not up to our expectations, we believe this has been due rather to the necessity of placing a sufficient number in homes to act as an advertisement. Two years ago we sold only 15 household types, while last year we sold 73 of the household and commercial type.

Our plans for 1928 have not been completed at this writing but will call for a greatly increased effort in the way of additional salesmen, advertising, both newspaper and direct-mail, and above all, what I feel the most necessary work, the education and training of our commercial men on a persistent and consistent plan.

To Cultivate Industrial Field

Industrial uses of electricity will be encouraged during the forthcoming year by the Great Western Power Company of California, according to R. A. Sharon, assistant to the vice-president and general manager. He goes on to say:

During 1927 there was a material decline in building activities throughout the territory as compared with 1926. This decline was felt most noticeably in residential sections. Considered as a whole, however, residential business was slightly above normal. There was quite a noticeable expansion in the industrial field, particularly with consumers already being served. Additional loads to these consumers resulted in a very material increase in kilowatts connected during the year as compared to previous years.

The main creative sales effort of the company was confined to the sale of ranges, water and air heaters, and the results of this effort indicates a very material gain in the sale of these appliances as compared to former years. Our records indicate that in excess of 15 per cent of the consumers of our company are now cooking electrically and the revenue from this source has shown some remarkable gains in the past four years.

For the year 1927 the revenue for cooking and heating shows an increase in excess of 200 per cent over the year of 1923. This increase has not been the result of a sudden spurt but a normal steady increase each year. In 1926 the average domestic consumption on the Great Western system was 547 kw.-hr. per consumer per year. In 1927 this has increased to more than 576 kw.-hr. per domestic consumer per year, and it is expected that in 1928 this will be increased to more than 600 kw.-hr. per domestic consumer per year.

Excellent progress has been made in the sale of ranges to apartment houses. Twenty-two apartment houses were equipped with electric ranges during the year. Most noteworthy of these were the Cathedral Apartments and the Mark Hopkins Hotel.

Following is the record of appliance sales of 1927 and the estimated sales of 1928:

	Ranges	Water Heaters	Air Heaters
1927	1,200	400	750
1928	1,800	750	1,000

The company feels that the industrial field presents an excellent possibility for development of heating load. We have formed an industrial heating department and during 1928 considerable effort will be devoted to the application of electric heating in industrial plants for manufacturing processes.

We have no absolute figures on the number of refrigerators added to our lines; our closest estimate, however, being approximately 1,500.

Rural Electrification Program

An intensive rural electrification program is to be undertaken by the Idaho Power Company, according to L. W. Brainard, acting sales manager of the company, Boise, Idaho, who described the plan in these words:

Additions are being made to our sales organization with a view to putting a great deal of effort into a rural electrification program. It is being planned to put rural sales representatives in the field to devote their entire time each to a small area of rural territory with a view to securing additional rural customers by building new rural extension lines and increasing the kilowatt-hour consumption of present rural customers and by assisting them in more completely electrifying their farming operations. These rural sales representatives will co-operate with manufacturers, jobbers and local dealers in the selling of electrically operated farm equipment, such as domestic water systems, milk separators, milking machines, etc.

In addition to lending co-operation to the sale of such equipment these respresentatives will be responsible for the sale of all domestic electric appliances as regularly carried for sale in our retail stores. It is estimated that through this rural sales activity during the year 1928 we will contract for and build approximately 150 miles of new rural distribution lines which should serve approximately 600 new rural customers. In addition to securing these new customers it is estimated from a survey of the field that we should be able over a three-year period to increase the kilowatt-hour consumption of all present rural customers approximately 50 per cent. I feel very optimistic concerning this rural electrification program. Awaiting the total final results of our 1927 business, I am not able at this time to give all the information I would like to make available to you, particularly average domestic kilowatt-hour consumption.

Merchandise sales show that during 1927 we oversold by a good margin the electric range quota set up at the beginning of the year. The quota set for 1927 was 1,000. Sales amounted to 1,441. This is an increase of 106 over our 1926 range sales. Reports show that the increase in sales was not made during what are usually termed the "range sales months," but rather during the spring and fall months of the year, a particularly good increase being made in December as a result of featuring a Christmas range campaign. These figures seem to indicate that we have established electric cooking to a point where the sale of ranges is an all-year-around activity and not confined to two or three campaign months.

At the close of 1927 we show an increase of 866 domestic cooking customers, as compared with the same date, 1926. Average figures for 1927 shown an electric cooking saturation of 33 per cent, that is, 33 per cent of our residence customers are cooking electrically. By towns this saturation percentage vaires from 14 per cent to as high as 57 per cent. Apparently our present users are our best advertisement, as in most cases the number of ranges sold per 100 residence customers was largest in those places having the largest percentage of electric cooking saturation. The total ranges sold, 1927, was 1,441. The average number of ranges sold per 100 residence customers was 6. Our range quota for 1928 is 1,500.

Final figures are not available on the sale of water heaters, but the total will be approximately 500 water heaters sold.

Our sales activities for 1928 will be very active, particularly in the promotion of electric ranges and other of the larger current-consuming devices.

Has Merchandise Display Room

Although Burdett Moody, general agent, Bureau of Power and Light, City of Los Angeles, would make no statement, facts given recently in an interview to a representative of ELECTRICAL WEST by A. W. Elliott, manager, domestic service department, indicate rather clearly the extent of commercial activities of the Bureau of Power and Light, Los Angeles.

The Bureau sells no merchandise except to its own employees. Two years ago, according to Mr. Elliott, the Bureau started developing a display room for electrical merchandise. It was felt that there was need of a display room to show all of the various standard lines of electrical merchandise to customers. "We had no desire to go into the selling of merchandise," said Mr. Elliott, "as we felt that was the place of the dealer. As a municipal organization we did not feel that we should compete with the dealers in our city."

The purpose of the display room and the work of the domestic service department was then to help in the sale of electrical merchandise and to work with the dealers, department stores, hardware dealers and other merchandising outlets and through them to foster sales.

The display room contains 672 individual pieces of equipment, whose total value was in excess of $40,000. The equipment has been placed on display in co-operation with the jobbers and manufacturers.

A staff of eleven people, two of whom are graduate home economists, is maintained. Cooking classes are held on Mondays and Thursdays in a small auditorium provided. Cooking classes are maintained in outside dealer stores when requested and house demonstrations are made on every range service on the lines of the Bureau. Range service is maintained by the Bureau, the customer being charged only for new materials used. "As a consequence we haven't lost a service to gas since we began servicing," said Mr. Elliott, who declared that the Bureau was forced into servicing of ranges because the average contractor did not specialize on servicing of ranges and too many types of ranges and parts were necessary to do a good job.

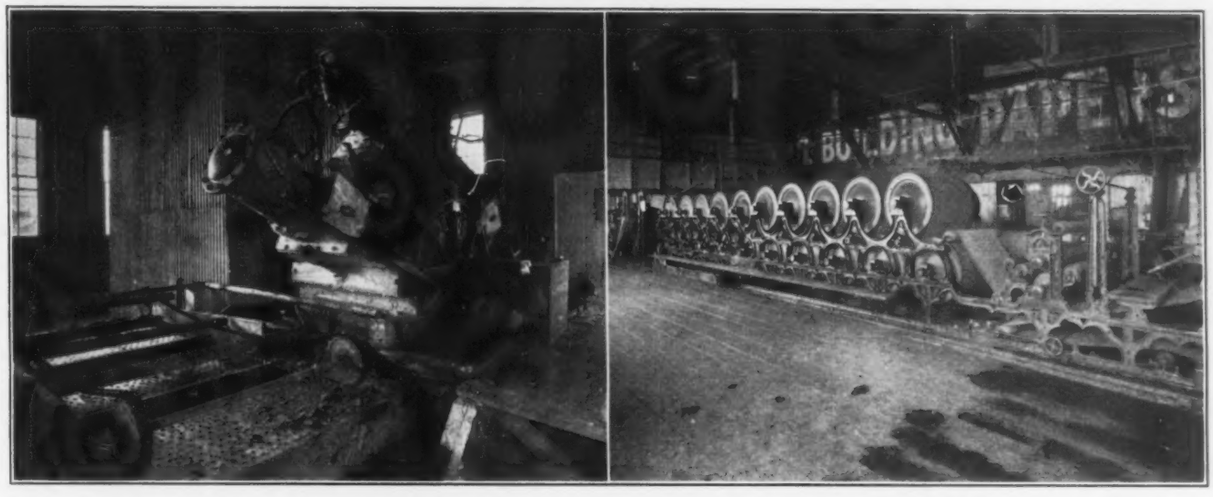
In the display room customers of the Bureau are encouraged to come and try the apparatus themselves and to sell themselves on whatever apparatus they choose. No sales effort is directed to sell any particular type of equipment.

One man is maintained as a specialist on lighting to advise commercial and domestic customers. One man is maintained for the sale of electric ranges in apartment houses in the city metropolitan area. Two men are employed to do similar work in the outlying districts. One man is kept for the promotion of heavy-duty industrial heating for commercial cooking.

Branch display rooms are planned in outlying districts of the city, according to Mr. Elliott. The first will be opened at Van Nuys in the near future.

Mr. Elliott also made the statement that the Bureau might be forced into the selling of ranges and heavy-duty appliances in order to get adequate distribution and to build load of this character, feeling that the number of ranges sold under the present system was not satisfactory..

A campaign of goodwill advertising to point out the benefits of electricity in the home and advocate its greater use on the new rate recently established will be inaugurated this year. A service booklet giving service information on both the water and electric departments has been issued and will be given distribution to all customers. Displays will be maintained at all shows and fairs during the year.



Four-pocket Waterous grinder and bull screen at the Sidney Roofing and Paper Company, Victoria, B. C. This grinder is direct-connected to a 500-hp. synchronous electric motor. Right: interior of the plant showing drying rollers.

Socket Power Possibilities

"There is one thing which I think is worthy of especial mention and that is A and B socket power for radios," says Frank Weiss, manager new busineses, Los Angeles Gas and Electric Corporation. "Many thousand have been placed on our system during the past year, and a great many more no doubt will be sold on our system during the year 1928. This class of business has had very little support from the power companies, although the central stations receive an average of approximately $1 per month per installation. There is no question but that utilities are overlooking what I believe to be the biggest new development as a load builder during the past twelve months."

My answer to the range question I think will be fairly accurate. On Jan. 1, 1926, we had 247 electric ranges on our system; Jan. 1, 1927, 292; and Jan. 1, 1928, 420; or a gain of 128 ranges during 1927. The 1927 gain is made up of 25 residence installations and 103 apartment house installations.

We made no spectacular installations during the year 1927, but we did have a splendid gain in meters and sales considering the slowing up of building operations. On Jan. 1, 1926, we had 117,660 light meters and 5,756 power meters; Jan. 1, 1927 we had 126,885 light meters and 6,270 power meters; Jan. 1, 1928, we had 135,902 light meters and 6,941 power meters—a gain in 1926 of 9,225 light meters and 514 power meters, and a gain in 1927 of 9,017 light meters and 671 power meters.

Our kilowatt-hour sales (not send-out) for the year 1925 were 156,498,485; for 1926 they were 174,678,524, or an increase for the year 1926 over 1925 of 18,180,039. Our sales for 1927 were 204,159,990, or an increase for 1927 over 1926 of 29,481,466, which made a 16.88 per cent increase for the year 1927—a very good showing, I consider.

We do not merchandise and therefore I have laid no special plans for load building. We will of course cooperate to the fullest extent with the dealers at all times in promoting sales through advertising and contacting consumers with our sales force.

Present Complete Consumption Data

A most complete and interesting analysis of the kilowatt-hour consumption of the various types of customers on its system is presented by J. C. Plankinton, sales manager, Northwestern Electric Corporation, Portland. This company's figures are interesting not only for their completeness, however, but for the consistent increase they show and for the good showing they make for the commercial activities of that company. Mr. Plankinton's figures are prefaced by the following remarks:

Net growth of new consumers for the system for the year 1927 was 2,226 and the net increase in connected load 13,368.35 kw. In each of these cases the net figure is the difference between the total connected and that permanently disconnected and does not take into account temporary disconnects on account of vacancies, etc.

The tables below (II and III) give the kilowatt-hour consumption for the different classes of consumers.

There has been very little development of new uses of electricity in this field in the past year, and about the only thing we could refer to as unusual loads would be street lighting and possibly development of theatrical load. In this connection, we would mention the new Portland Theater which has a seating capacity of some 3,200 and will have some very elaborate lighting features—leased to Paramount Theaters Corporation; also the new Tebbetts Oriental Theater which will have a seating capacity of about 2,400.

The number of ranges added to our system in 1927 was 1,392. This includes an estimate of those to be connected in December. Our quota on range sales for 1928 is placed at 1,800 There are a total of 6,097 electric ranges on our lines at the present time.

The number of water heaters connected in 1927 was 230. The quota for 1928 is 500.

We have attempted several times to secure data on refrigerator sales for this territory but have not been able to get anything that seemed to us to be correct. We have at the present time on our lines that we have sold and connected approximately 700 electric refrigerator units. This includes domestic and apartment house installation counting each individual frost tank in apartment house installation as a unit.

The schedules following will give you the results of some of the campaigns that were carried on during the past year.

Analysis of October, 1927, Lamp Campaign

District	No. of Lamps Sold	No. of Res. Consumers	Lamps per Res. Consumer
All branches	22,638	19,358	1.17
Portland	17,084	15,635	1.09
Vancouver, Wash.	540	1,000	0.54
Camas	1,512	672	2.26
Ridgefield	1,362	1,133	1.18
Kalama-Woodland	1,018	488	2.08
Rainier	1,122	430	2.61

Increased Consumption

Average lamp in residence socket is	40	watts
Estimated number of lamps immediately put in use, 1/3	7,546	
7,546 lamps increased 20 watts	150,920	watts
150,920 watts, with average daily use 1½ hr.	226	kw.-hr.
226 kw.-hr. per day for 360 days in year	81,360	kw.-hr.
Average kw.-hr. per lamp immediately used per year	10.8	

				Est. Annual Revenue
Portland	$\frac{17,084}{3} = 5,695 \times 10.8 = 61,506$	kw.-hr. × 3.0c =		$1,845.18
Vancouver, Wash.	$\frac{540}{3} = 180 \times 10.8 = 1,944$	kw.-hr. × 3.0c =		58.32
Camas	$\frac{1,512}{3} = 504 \times 10.8 = 5,443$	kw.-hr. × 7.0c =		381.01
Ridgefield	$\frac{1,362}{3} = 454 \times 10.8 = 4,903$	kw.-hr. × 4.0c =		196.12
Kalama-Woodland	$\frac{1,018}{3} = 339 \times 10.8 = 3,661$	kw.-hr. × 9.5c =		347.80
Rainier	$\frac{1,122}{3} = 374 \times 10.8 = 4,039$	kw.-hr. × 8.0c =		323.12
			81,496	$3,151.55

TABLE II

As of Dec. 31, 1926.

Location	Residential Kw.-hr. per Consumer	Residential Revenue per Consumer	Commercial Kw.-hr. per Consumer	Commercial Revenue per Consumer	Power Kw.-hr. per Consumer	Power Revenue per Consumer
All branches	816	$28.00	3,900	$143.61	149,600	$ 1,238.80
Portland	855	28.25	4,380	132.54	55,200	836.14
Vancouver	758	25.09	2,390	88.03	417,500	2,788.72
Camas-Washougal*	1,195	35.06	1,470	37.13	2,465,000	10,995.51
Ridgefield	345	26.11	825	41.17	28,100	618.75
Woodland	332	22.64	810	43.81	2,713	130.36
Kalama	615	26.00	1,068	57.42	23,829	243.87
Rainier	347	22.69	1,295	79.39	39,099	626.43

* Report in error; being corrected.
Note: No municipal or public utility figures included.

TABLE III

The following table shows the same information as of Sept. 30, 1927:

District	Residential Kw.-hr. per Revenue	Residential Revenue per Consumer	Commercial Kw.-hr. per Consumer	Commercial Revenue per Consumer	Power Kw.-hr. per Consumer	Power Revelue per Consumer
All branches	946	$31.16	4,300	$132.62	143,819	$1,190.63
Portland	1,002	31.27	4,879	148.23	55,163	826.83
Vancouver	868	26.82	2,418	86.61	451,376	2,959.78
Camas-Washougal	1,288*	37.53*	1,714*	43.25*	2,237,946	9,939.19
Ridgefield	408	32.49	832	37.35	6,210	166.24
Kalama	580	28.94	1,050	54.53	8,470	229.28
Rainier	364	26.57	1,379	77.53	45,496	886.18

* Incorrect; pending adjustment.
Note: Municipal and public utility figures not included.

Average cosumption for lighting purposes was assumed for Portland, Vancouver and Camas as 30 kw.-hr. per month, which gives basis for block of rate in which the additional kw.-hr. will fall. In the case of Ridgefield, Kalama and Rainier, the residence lighting use of 20 kw.-hr. per month is assumed as an average.

Appliance Campaign

Hotpoint range campaign—April 1 to April 30, 1927. Total ranges sold	295
Hotpoint range campaign—Oct. 1 to Nov. 15, 1927. Total ranges sold	223
Westinghouse iron campaign—May 1 to June 30, 1927. Total sold	210
Percolator campaign—April, 1927. Total sold	126
Toaster campaign—March and April, 1927. Total sold	378
Waffle iron campaign—February and March, 1927. Total sold	521
Air heater campaign—November and December, 1926; January and February, 1927. Total number of heaters sold	389
Fan campaign—June, July, August and September, 1927. Total number of fans sold	98
Everhot cooker campaign—June, July, August and September, 1927. Total number cookers sold	229

Million Dollar Budget for P. G. and E.

A buget in excess of a million dollars for sales and advertising expense and the most ambitious commercial program in the history of the Pacific Gas and Electric Company are announced for 1928 by R. E. Fisher, vice-president in charge of public relations and sales. Mr. Fisher's statement follows:

The year 1927 was a satisfactory one for our company from a commercial standpoint. Considerable time was spent in the study and analysis of the merits and costs of various load-building activities and these studies have been made the basis for the most ambitious commercial program ever undertaken in this territory. A sales and advertising budget of $1,041,000 has been set up with $633,000 to be spent in the development of electric load and $408,000 to be spent for new gas business. This budget compares with one of $583,000 for 1927 and represents 1.5 cents per dollar of estimated gross revenue.

The two most important considerations in the drafting of the 1928 program were the loading of existing facilities to fullest possible extent and the continuation of the company's policy of complete dealer co-operation. Added impetus will be given to the program by the establishment of reduced rates of the inducement-type as has been announced in the press.

A quota of 67,490 kw. has been set up for electric cooking, water heating and air heating. A sales force consisting of 30 electric range salesmen, 5 commercial cooking and heating salesmen, 39 auxiliary electric heating salesmen and 12 rural domestic salesmen will be employed in securing this load. A total of $141,000 exclusive of commissions has been budgeted for this work. Estimated sales include $500,000 in new equipment and $282,000 for labor and materials for the necessary wiring for this equipment. Three industrial heating specialists and four sales engineers experienced in converting isolated plant load will work in these two fields in each of which quotas of 3,000-kw. have been established.

In the domestic lighting field 33 salesmen will be employed while 16 men will devote their entire attention to commercial and industrial lighting. A quota of 2,750 kw. has been set up for the five specialists who will work on the street, highway and airway and airport lighting. Twelve specialsts will be engaged in the rural districts in the promotion of new line extensions and in the solicitation of additional business on the rural lines already completed.

These activities will result in estimated merchandise sales of $1,187,000 and in the expenditure by the public of an additional $398,000 for labor and wiring supplies incidental to the installation of the equipment. Salesmen will make a total of 545,000 calls upon our electric customers not only for the solicitation of new business but also in the promotion of good will. The value to the industry and particularly to the electrical dealers of these personal introductions of the various services of electricity to our customers cannot be overestimated. It has been our experience that less than two in twenty of these calls result in immediate sales.

The quotas of the various appliances to be sold during the year follow:

4,700 electric ranges
2,400 electric water heaters
5,500 heavy duty air heaters
8,000 auxiliary air heaters
262,000 Mazda lamps
10,000 kitchen lighting units
5,000 portable indirect lamps
2,500 bedroom lamps
3,600 Duplexalites
3,600 lamp kits
12,000 electric refrigerators to be sold through dealers

As has been mentioned dealer co-operation has been one of the principal considerations in the development of this program. Every opportunity will be accorded the dealers throughout the territory served to tie in with the various activities.

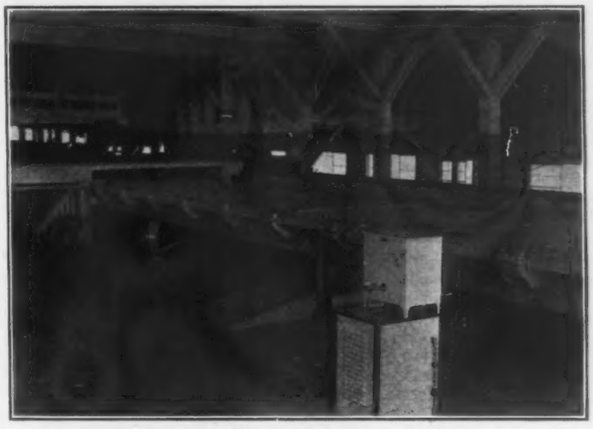
Our expectations are not only for a good year for 1928 but for the greatest load-building record in the history of the industry.

Pacific Power and Light Progresses

A satisfactory showing for 1927 and excellent prospects for 1928 are reported by George C. Sawyer, sales manager, Pacific Power & Light Company, Portland. Mr. Sawyer's statement follows:

The year 1927 must be considered a satisfactory one for the Pacific Power & Light Company. Notwithstanding the fact that several rate reductions were made during the year, our business has shown satisfactory progress. The number of customers increased during the year from 46,008 to 48,731, a net increase of 2,723. Kilowatt-hours sold in 1926 totaled 132,041,644, while in 1927, which was a backward year in so far as irrigation power consumption was concerned due to unusual rain conditions, the total kilowatt-hours sold were 134,845,532.

The average increase in consumption of electricity by residential consumers continues to grow year by year, indicating that our efforts to popularize the use of electricty in the home through merchandising are producing the desired results. In 1926 the average consumption per residential customer was 531 kw.-hr., in 1927 the average consumption was 620 kw.-hr. An electric range campaign covering a period of two months from May 15 to July 15 placed 432 ranges, showing a satisfactory increase over our quota of 300 ranges for the campaign. The total number of ranges added to our system in 1927 was 655. Our quota for 1928 is 750, and we fully expect to exceed this figure. A total of 409 electric water heaters were added to our lines during the year and our quota for 1928 is 500. A washing machine campaign conducted from Sept. 15 to Oct. 15 resulted in the sale of 316 washing machines. A waffle iron campaign conducted in the month of February, consisting of office displays and demonstrations and newspaper and stuffer advertising, resulted in the sale of 1,083 Edison waffle irons. A Mazda lamp campaign extending over a period of 6 weeks and participated in by all employees sold 40,574 lamps. Electric refrigerators sold by the company during 1927 totaled 88 and our quota for 1928 is 250. Electric refrigeration sales have not been pushed as vigorously in the past as they will be in the future due to our belief in the necessity of having an adequate sales and service set-up before embarking on this work with our entire energies.



Electrically refrigerated drinking fountains in the plant of the Clearwater Timber Company, Lewiston, Idaho, served by Pacific Power & Light Co.

We have no reason to expect other than a successful year in 1928, both in the sales of merchandise and the addition of new load. The work of the commercial department will become more intensive throughout the new year.

Portland Has Christmas Lighting Contest

Showing the interest which is being given to lighting in that community to be on the increase, with potential business prospects bright in this department of commercial activity, A. C. McMicken, general sales man-

ager, Portland Electric Power Company, describes the Christmas outdoor lighting activity in Portland this year. He says:

An outstanding activity just closed was an outdoor illumination contest conducted under the auspices of the Advertising Club of Portland, which resulted in a large number of homes and community clubs participating for cash prizes for the illumination of the exteriors of buildings, shrubbery, and trees for the holiday season. The initial contest just closed has been so successful that we expect to see it very greatly augmented each succeeding holiday season.

The year 1927, just closed, has been a very satisfactory one in the light and power department of our company. We have had a very good increase in kilowatt-hour sales. While at this writing exact figures cannot be given, all of the December figures not being in, there has been a net gain of approximately 5,000 new customers of all classes and material increases in the kilowatt-hour consumption per customer, particularly of residential customers. The average residential customer for the year 1926 consumed 674.9 kw.-hr., for all purposes. This figure includes those customers having ranges and water heaters as well as those not having them. Although the figures for 1927 are not complete, it now appears that the average residential consumer for 1927 used approximately 790 kw.-hr. as compared with 674.9 kw.-hr. in 1926. Commercial lighting customers also show a healthy increase in the kilowatt hours used per customer, and in general, the kilowatt-hour sales for all classes of business have increased satisfactorily.

Approximately 2,200 electric ranges have been added to our lines and a number of successful small appliance and incandescent lamp campaigns have been conducted. There are now in excess of 11,000 electric ranges on our lines and we expect to add approximately 2,500 more during 1928. We have not been pushing flat rate water heating, but in spite of this fact over 700 water heaters were added during 1927 and probably 1,000 more will be added during 1928. Our company sold directly about 200 domestic refrigeration installations and installed about 300 coils and 44 compressors in apartment houses. We are unable to give figures for the sale of refrigerators by other dealers.

Our plans for 1928 include intensive waffle iron, toaster and percolator campaigns during February, March and April, and range campaigns during May and June, electric refrigeration during June, July and August and range campaigns again in September and October. At the same time we are carrying on every month in the year campaigns to improve the standard of lighting in commercial houses and industrial plants.

Largest in Company History

Figures given by Henry J. Gille, general sales manager, Puget Sound Power & Light Company, Seattle, show that company's business during the past year to have exceeded all records. The figures, notably of rural consumers and of the number of ranges sold, show the work of the rural specialist service and the effects of several large range campaigns to have produced results greater than anticipated. Mr. Gille summarizes last year's work and this year's prospects as follows:

The new business secured by the Puget Sound Power & Light Company during the year 1927 is reflected in the largest increase in gross earnings for light and power in the history of the company. The gross light and power revenue for the twelve months ending Dec. 31, 1927, was $10,228,683 (December estimated) as compared with $8,978,683 in 1926, which is an increase of $1,250,000, or approximately 14 per cent, as compared with an increase of $884,591 in 1926 over 1925, or approximately 11 per cent.

Beginning 1927 with 119,059 light and power customers connected to its system, the company shows an increase during the year of 10,740 customers, making a total of 129,799 customers, or an increase of 9 per cent. In this connection it is interesting to note that a special effort was made throughout the year to develop business which could be served from our existing distribution facilities.

Included in the increase of 10,740 new customers are approximately 5,500 rural customers, bringing the total number of rural customers now served by this company to about 40,500. Of the new rural customers, about 3,200 were secured through the construction of new distribution lines, while the balance was added to lines built prior to 1927.

One of the most gratifying developments of the year, of course, has been the marked increase in residence lighting and domestic power, which covers electric lighting, electric cooking and water heating. The increase in gross earnings from this business was $505,135, which is 19.4 per cent over 1926, while the increase in kilowatt hours sold to residence customers was 16,115,737 kw.-hr. which is an increase of 27.4 per cent over 1926. In 1926 the average revenue per residence customer for 90,430 average customers was $28.72 per annum. In 1927 we had an average of 99,561 residence customers with an average revenue of $31.16, which is an average increase of $2.44 per residence, or 8½ per cent. In 1926, our average current consumption per residence customer for the average number of customers during the year was 650.3 kw.-hr. per customer. In 1927, our average current consumption per residence customer for the average number of customers served during the year was 753 kw.-hr. per customer, which is an increase of 15.6 per cent.

We have closed contracts during the year for new industries aggregating approximately 14,000 kw., consisting of cement mill, clay products, lumber mill, wood working, shingle and lath mills, gravel pits, coal mines, pulp and paper mills, dairy products, bakeries, ice and cold storage, bridge and structural steel, canneries, condenseries, drainage pumping, irrigation pumping and power for miscellaneous industries.

We have also closed long time contracts for a large number of buildings for commercial light and power and steam heat as well as a ten-year contract for light and power for all state institutions contiguous to our lines.

With regard to the future, residence and commercial building activity in most of the centers of population in western Washington is expected to continue in 1928 as in 1927, while the outlook for new industrial power load is also very promising.

With the increasing popularity of electric cooking, water heating and electric refrigeration, we have reason to believe that this branch of our business will continue to develop even more rapidly in the future than it has in the past, while the use of our service on the farm and in the poultry industry is growing very rapidly.

We sold over 8,000 electric ranges in 1927, and our quota for 1928 is 10,000 ranges.

During 1927 we added 1,700 water heaters to our system, but our quota for 1928 has not yet been decided upon.

Our refrigerator sales for 1927 were approximately 300, and the quota for 1928 has been set at 1,800.

Merchandising Store Planned

A large downtown merchandising store in San Diego is planned for this year by the San Diego Consolidated Gas & Electric Company, according to A. E. Holloway, superintendent of the commercial department, who outlines the plan in the following words:

We plan on the installation of an electric merchandising department for the merchandising of electrical appliances in our main office building. The corner now occupied by the bank will be remodeled so that it will be joined with our general office and be used for appliance display and sales room. This store will be opened some time during the first half of the year 1928. The establishment of a new appliance sales department will be one of the chief activities of our sales department during the coming year. In this store it is planned that we will carry and sell a complete line of appliances and have appliance salesmen out in the various districts of the city. This work has been established in all of our outside territory during the last year, but no direct sales work has been carried on in San Diego.

In the merchandising line, during the last year we have installed six electrical stores in our outside districts: at Oceanside, Escondido, Coronado, Chula Vista, La Mesa and La Jolla. These stores are operated in conjunction with our regular district offices and are completely equipped for merchandising electric appliances throughout. In each one of the branches we operate out of the office from one to two merchandising salesmen who work on merchandising alone.

No particularly large or spectacular loads were signed by us during last year. However, the general increase in power and lighting has been very satisfactory especially the increased activity in better street lighting. We have had a number of very fine installations of street lighting made during the last year.

A total of 4,550 electric consumers were gained for the year 1927 and 2,300 gas consumers. This showed a total increase in connected load of 8,100 kw.

As for the growth of average domestic consumption, we have no record by which we can tell this growth as our domestic customers are not segregated.

Trade in general in our territory is very good. The jobbers report a very good business, in fact an increase over the previous year. The following figures may prove of interest:

(1) Number of ranges installed on our system, 1927	500
Quota for coming year	600
(2) Water heaters installed on our lines for 1927	238
Quota for coming year	300
(3) Approximate number refrigerators sold during 1927	925

As you know we do not sell refrigerators ourselves, and therefore have no quota assigned to this work.

Overbalance Agricultural Power Losses

Despite a period of plentiful water, resulting from last winter's heavy rains and a depressed agricultural market, both the San Joaquin Light & Power Corporation and its subsidiary merchandising arm, the Valley Electrical Supply Company, were able so to build up commercial and domestic power uses during the year as to maintain an undisturbed balance sheet. Bogey for both domestic and general power were more than exceeded for the year.

A succinct summary of the year's results is given by A. M. Frost, manager of sales, San Joaquin Light and Power Corporation, Fresno, in these words and tables:

The following tabulation will give you information on our bogey for different classifications of service:

San Joaquin Light & Power Corporation and Midland Counties Public Service Corporation

	Bogey 1927 in Kw.	Business Signed 1927 in Kw.	Bogey 1928 in Kw.
Lighting	5,092	5,730	6,259.00
Domestic and commercial combination heating and cooking service	12,041	16,236	15,000.00
General power—industrial and oil field power	12,100	19,244	9,427.37
Agricultural power	21,641	14,383	16,320.00
Total kilowatts	50,874	56,593	47,006.37

The merchandising program for electric ranges and water heaters, conducted by the Valley Electrical Supply Company, worked out as follows:

Bogey 1927 in Kw.	Sales 1927 in Kw.	Bogey 1928 in Kw.
12,000	12,663.70	15,000
	(1,058 ranges sold)	(1,250 ranges)
	(701 water heaters sold)	(925 water heaters)

Kilowatt-hour sales per residential consumer, Nov., 1925, to Nov., 1926, amounted to 546 kw.-hr., whereas for Nov., 1926, to Nov., 1927, they amounted to 628 kw.-hr. per consumer.

It is planned, through intensive selling of domestic appliances, to raise this figure to over 700 kw.-hr. for the next twelve-months period, and to continue in an effort to increase this classification of service at the rate of 100 kw.-hr. per year, from now on.

A special lighting salesman has been employed for solicitation of commercial and industrial lighting. His program, as set up, contemplates the sale of 500 kw. in connected load for the next twelve months. He will solicit all commercial and industrial lighting consumers on the San Joaquin and Midland Counties systems, on a definitely laid out program, will be provided with samples of lighting equipment, and will arrange for the sale of the equipment and installations to be made by the local contractor-dealers.

There were approximately 800 electric refrigerators sold on the lines of the San Joaquin and Midland Counties systems during 1927. It is estimated that 2,000 will be sold in the same territory during 1928.

The Merchandising Good Right Arm

No picture of the San Joaquin situation could be dismissed in so few words. The simple figures of load signed and bogey set do not give an insight into the organized plan whereby this merchandise is to be distributed to the public. The following facts concerning the sales program whereby the domestic load is to be built up were condensed from the sales plan outlined for the year by H. H. Courtright, manager, Valley Electrical Supply Company, and submitted to the management of the power company at the close of last year.

Merchandise sales for the company, both in its own merchandising stores and by means of its through-the-dealer selling, are divided into heavy-duty appliance and lamp-socket or convenience-outlet appliance sales. Of the former the quota calls for the sale of

1,250 ranges
925 water heaters
425 large air heaters
425 miscellaneous heavy-duty appliances.

This quota has been split up to conform with possibilities in the individual districts served by the company. Each district is assigned its shares of the quota, in kilowatt capacity, to sell during the year. The sales value of the merchandise is estimated at 310,800 and should yield a total load of 15,000 kw., bringing in an estimated annual income of $187,500. For placing this load upon the lines the Valley Electrical Supply Company will bill the power company approximately $76,200 only, or upon its established basis, for only approximately 6,000 of the 15,000 kw. it expects to add.

The sales force consists of a supervising salesman, 13 salesmen and the home economics demonstrator, whose work requires two calls the first year and one each succeeding year to every range purchaser in order to keep the electric cooking idea stimulated and operating.

Stimulation of the existing customer's use of energy is one of the major responsibilities of this company, with the result that during the past year the return to the power company per kilowatt of connected load on ranges and water heaters was $12.50 as against a state average of $7.50.

This year's range selling will be stimulated by an innovation begun last year in the placing of displays in each of the power company district offices. An ingenious card index system giving customers billing information and prospect segregation, will be available to dealers and employees in selling ranges. Extensive advertising, demonstrations, fair displays, etc., will be used to stimulate sales on a continuous program with an occasional special offer.

Aside from the major appliance quota of 15,000 kw. an estimated load of 11,656 kw. in lamp-socket or table appliances will be essayed by the Valley Electrical Supply Company, both through its own stores and by means of its through-the-dealer selling plan (See **Journal of Electricity**, October 15, 1926, pp. 270-276, and **Electrical West**, Oct. 1, 1927, p. 192), which has been described many times but which still seems to mystify many, probably as much as anything because of its sheer simplicity.

The quota of the number of appliances which it is proposed to sell in this classification during 1928 is as follows:

Appliances	V. E. S. Co. Retail Sales	Through Dealer Sales
Cookers	2,000	3,000
Automatic heaters	500	1,000
Toasters	750	1,500
Waffle irons	1,500	1,750
Flatirons	1,500	2,000
Percolators	1,500	1,200
Corn poppers	1,000	
Fans	1,000	
Table stoves	500	
Heating pads	400	
Vacuum cleaners	500	
Washing machines	600	
Refrigerators	600	
Miscellaneous	2,000	
	14,350	10,450

This makes a total of 24,800 pieces and represents a connected load with a capacity of 11,656 kw. which it is estimated will return to the power company $116,560 per year.

"The idea seems to have got abroad," says Mr. Courtright, "though I don't know why it should if the details of the plan are read carefully, that the through-the-dealer plan calls for a sort of subsidy by the power company of the dealer. Nothing is farther from the truth. The dealer is incorporated into the program for the very obvious reason that we want to get as wide a distribution as possible. All the power comapny pays for is to stimulate the market by means of advertising, displays, demonstrations, sales help and salesmanship. The power company desires to force-feed the market, so every possible outlet is used. Dealers can co-operate or not as they choose. The wide-awake dealers co-operate and they profit accordingly. In heavy-duty as well as in small appliance sales they have a big share of the burden to carry. They carry the credit risk and we carry sales promotion cost. That's fair enough, isn't it?"

Kitchen fans will be campaigned this year. A program of advertising on this already is planned.

Lighting, both domestic and commerical, will be included in the year's selling activity. The quota calls for 7,000 kitchen and bathroom units, with 100-watt lamps a minimum; 1,000 portable lamps, and 100,000 Mazda lamps. This

home lighting equipment will have a sales value of $71,240 and add approximately 400 kw. to the lines, bringing an estimated annual revenue of $18,400. No charge to the power company will be made for this sales effort. Carton sales and house-to-house sales and stressing of proper voltage lamps will be part of the plan.

In commercial lighting, 1,200 office and store units are in the quota, having a merchandise value of approximately $12,000 and adding 240 kw. to the line, with an annual revenue estimated at $18,000. No sales charge will be made for this work.

City of Seattle Outlook Optimistic

Short and concise, the report of J. D. Ross, superintendent, City of Seattle Lighting Department, declares that the outlook is optimistic, based upon the past year's accomplishments. Mr. Ross says:

We are pleased to state that City Light is closing its most successful year and facing prospects for 1928 brighter than ever before. The figures below are the cause of our optimism.

	1926	1927
Kilowatt-hours generated	232,848,000	277,000,000
Maximum demand, kilowatts	67,000	75,000
Ranges installed	3,406	3,552
Total ranges on line		14,679
Estimated range sales for 1928		3,800
Water heaters installed	1,008	1,000
Total water heaters on lines		5,013
Estimated water heaters for 1928		1,200

New Loads Connected in 1927:

Electric furnaces for the manufacture of steel bars and steel grinding balls.

Electrically heated steam boilers replacing gas heated boilers used on clothes pressers. We expect to replace all gas heated boilers in Seattle on this class of business.

The number of refrigerator sales in the city for the year 1927 is approximately 5,000.

Edison to Sell 291,000 Horsepower

"The Edison Company has closed its books for 1927, with all of its quotas realized, and enters the New Year with the most ambitious program it has ever undertaken," says W. L. Frost, general commercial manager, Southern California Edison Company, Los Angeles, and goes on to state:

Condensed to a single figure, this program calls for 291,000 hp. of new business to be developed during the calendar year 1928.

Our quotas for 1927 called for 205,700 hp. and the actual amount sold exceeded this by 1,000 hp. The same report shows that 24,963 new meters were added. The estimate of new lighting load was 50,000 hp. and the actual amount connected was 49,177 hp. The anticipated new power load was 105,700 hp. and the amount realized was 114,232 hp. Range sales were estimated at 2,500 and while final reports are not available at this writing, the total for the year will probably exceed 3,000.

Among other interesting items in our report of total sales are 4,962 irons, 3,174 waffle irons, 751 percolators, 1,073 toasters, 3,003 cooker pots, 718 washing machines, 280 ironers, 1,150 water heaters and 2,260 vacuum cleaners. We estimated that a total of 16,675 of the smaller appliances would be sold and final reports will show that the total will exceed 17,000.

The most important items in our commercial plans for 1928 are new lighting load, agricultural power, industrial power, oil field lighting and power, and industrial heating.

To assist in developing this business the commercial department forces have largely been augmented by the employment of skilled specialists in the fields mentioned, this force including 20 power specialists, 13 lighting specialists, 6 industrial heating and oil specialists, all of whom will spend their entire time in a concentrated effort to extend our operations into fields which, so far, have not been cultivated aggressively.

In addition to the new business we expect to realize from the above activities, we are planning to secure a total of 66,000 hp. from the sale of current consuming devices to existing and prospective consumers. Among the more familiar devices we are setting out to sell both directly and in co-operation with established dealers: 5,000 ranges, 2,000 water heaters, 1,000 refrigerators, 1,800 washers, 600 ironers, 6,000 vacuum cleaners and 20,000 of the smaller appliances. For the first time systematic work will be done to stimulate the use of air heating in homes, offices, schools, hospitals and churches, and a minimum of 3,000 hp. in new load is anticipated from this source. A quota of 2,000 hp. in heavy-duty hotel, bakery and restaurant equipment has been established, marking the first effort of the Edison Company to do methodical educational work along this line.

The most extensive advertising program ever projected by the Edison Company will be used to support the various campaigns: 172 newspapers in the territory served will be used for the background of the advertising, and this will be supplemented by some 400,000 pieces of direct-mail material and 1,500,000 envelope stuffers going out to all of the consumers with their bills. These stuffers will be used to emphasize the small appliance specials, which will be offered in alternate months throughout the year.

Throughout 1927 we were gratified by the spirit of co-operation shown by other members of the industry and particularly on the part of retail electrical dealers, who have shown, at all times, a willingness to tie-in with our plans and who have exhibited a potential sales force which cannot be appreciated until these men are seen at work on the firing line. It is only natural that such splendid results should encourage a continuance of this co-operative plan, and the dealers will be a powerful factor in the realization

Water Heaters to be Featured

Consistent increases in all commercial activities, the development of oil pumping loads and the extension of domestic appliance service characterize the sales department progress of the Southern Colorado Power Company, Pueblo, Colo., according to W. N. Clark, vice-president and general manager. Reporting for that company he gives the figures and summarizes the year's work as follows:

	Sold 1927	Estimated 1928
Water heaters	22	75
Ranges	689	800
Refrigerators	39	130

During the past year we have increased the number of customers by approximately 900. In the power field we have made some developments in loads for pumping oil from newly discovered oil fields as well as in industrial and manufacturing and mining loads.

We have made some very encouraging increases in the number of ranges sold, the total amounting to approximately 2,000 ranges. This service has been so satisfactory to our customers that we expect to increase materially the number of ranges during the coming year. Refrigeration is becoming increasingly active and as indicated in the table, a substantial increase in the number of refrigerators connected will be attained.

We found that domestic water heating is entirely practicable. The use of well insulated, low wattage storage tanks appears to have solved this problem. The installation and sale of electric water heaters will be one of our major efforts.

The territory served is generally prosperous. We have increased the average consumption per residence consumer during the year approximately 50 kw.-hr. This increase will be reflected in the coming month due to the number of major appliances recently sold and it is expected that a larger increase in kw.-hr. per residence customer will result during the coming year.

We now have in Pueblo one of the finest electrical merchandising stores in the West and it has greatly increased our sale of current consuming devices.

"Plugging Away as Hard as We Can"

"Everlastingly keeping at it," seems to be a good formula for selling kilowatt hours, even though no campaigns are put on. At least for The Southern Sierras Power Company, according to George T. Bigelow, assistant general agent, this formula seems to bring results. The company made a substantial increase in its kilowatt-hour-per-domestic-consumer figure by this method. Mr. Bigelow declares:

The estimated number of ranges added to our system this year is 500, water heaters 200, and refrigerators 200. Our residence consumers have increased, taking the average for the twelve months, slightly less than 1,000. As you know, the residence load on our system is small compared with our power load and is quite scattered. We have, however, increased our kilowatt hours per domestic consumer per year from 501 kw.-hr. for 1926 to 560 kw.-hr. for 1927. This includes eleven months actual and one month estimated consumption for 1927.

As I believe I told you before, we do not put on intensive campaigns as I do not believe it suitable for such

scattered districts as we have. We simply keep our regular range men plugging away as hard as we can. I did not set quotas in 1927 and I do not believe I will in 1928. Conditions in small scattered towns change so radically from one year to another that quotas do not mean much if anything.

Tacoma Establishes Commercial Department

Refrigeration and water heating will receive special attention from the City of Tacoma Light Department, according to Llewellyn Evans, superintendent. The water heater, he declares in this interesting comment on the year's work, is the best revenue producer on the system, better by a slight edge even than the electric range.

During 1927 the Tacoma system has put to use a large part of the output of the new power station at Lake Cushman, and has established a new business department in charge of C. A. Lund, which is largely responsible for increasing this year's demand to 48,000 kw. as compared with 38,500 kw. for 1926. The number of customers has increased from 36,600 to 37,300. The number of electric bake ovens and commercial heavy-duty equipment has been increased by about 15 installations, practically all new business, the result of over a year's hard work on the part of H. F. Huggins.

The number of electric ranges added to the system during 1927 was 840.

The number of water heaters added to the system during 1927 was 800.

We have no figures on electric refrigeration. Most of the installations are confined to commercial houses and apartments, there being scarcely any residence use of refrigerator equipment. This business, however, is becoming of importance, even in this cool climate, so that by another year we may have data available.

If there is any one thing planned for special pressure next year it is electric water heaters. A recent analysis of our revenues shows it is the best revenue-producer we have, a water heater using an average of 228 kw.-hr. per month as compared with 212 kw.-hr. per month for an electric range. The 3¼-kw. heater is the popular size in Tacoma.

Meter-Reader Salesmen

An interesting experiment in sales promotion is being made in the territory of the Truckee River Power Company, Reno, Nev., according to George A. Campbell, manager of the company. He says of it:

We have replaced our meter readers with district representatives. A district representative is given a certain amount of territory and in that territory he reads the meters, collects the bills, adjusts the appliances and sells. He calls on the same families each month for all of the above purposes. In addition, if he is unable to sell, he turns the prospects over to the specialty men in the sales department who immediately begin working on the prospect. This system has only been installed a few months and, of course, still has many defects. However, we are gradually removing the kinks and it should be working smoothly by summer.

In addition to the above, new appliances are to be added to our stock and also a home demonstration department will be installed early in the spring.

Our advertising appropriation has been slightly increased and our sales department will also be increased during the summer months.

The gross sales of electrical appliances for 1927 were twice the sales of 1926. Electric ranges, refrigerators and the many small household appliances were all campaigned during the year; 77 electric ranges were sold, 16 water heaters and 22 electric refrigerators. The best household appliance proved to be the inexpensive electric cooker. This cooker was sold at the special price of $5.95.

For the year 1928 we are planning to give a great deal of effort to all electrical appliances and our bogey has been increased a great deal over 1927. Special attention is to be given to kitchen lighting, selling convenience outlets and to having the homes re-fixtured. The bogey for 1928 includes 100 electric ranges, 130 electric refrigerators and 50 water heaters.

The following gives the growth of our electric customers: Jan. 1, 1925—7,413; Jan. 1, 1926—7,749; Jan. 1, 1927—8,010; Jan. 1, 1926, there were 6,346 domestic customers connected to our lines, while Jan. 1, 1927, there were 6,471. The 6,471 consumers during the month of January averaged 51.3 kw.-hr. per customer and for the year averaged 620.2 kw.-hr. per customer. We estimate during 1927, 150 electric ranges and 100 electric refrigerators were put on our lines. We look for 1928 to be a banner year both in the sale of appliances per customer and the number of kilowatt-hours used per customer. Every effort will be made to make it so.

Utah Company Makes Range Rate

Inauguration of combination rates for domestic cooking and heating for the first time has opened up possibilities for increased range and water heater business in that territory, according to P. M. Parry, commercial manager, Utah Power & Light Company, Salt Lake City. Mr. Parry's letter contains many interesting comments, particularly as to seasonal selling of ranges, and as to merchandising policy on a "pay its way" basis. He states:

During 1927 we did a good deal of work and put forth a good deal of effort in the industrial heating field and were successful in developing a considerable amount of this load. This included an aggressive campaign for electric baking. During the year we converted two of the largest newspapers in our territory, so that their operations, including all metal melting operations, are now electric. Just recently there has been installed in Salt Lake City a large conveyor type oven, which is operating very successfully.

In connection with domestic service, we have carried on throughout the year an aggressive range campaign which has been very successful and demonstrates, at least in this territory, that it is practically as easy to sell ranges in the winter time as in the summer time, thus making this business an all-year-'round business, where originally it was considered more or less seasonal, summer business.

Left: South Temple St., looking west, Salt Lake City, showing new whiteway lighting system. Right: looking west on Second South St. from West Temple, showing new whiteway lighting.

In connection with domestic service, we put in effect in our entire territory, early last year, combination rates covering various classes of domestic service which we believe have been instrumental in at least stimulating our range, refrigeration and water heating appliance sales. With the inauguration of these rates we put forth our first efforts to sell water heating and this was the first time we had offered a special rate for water heating service. Although we put in these combination rates covering domestic service as optional rates, during 1927 we changed some 2,200 customers to these rates.

During the month of March, 1927, we conducted our regular Automatic washer campaign, during which we sold 1,367 washing machines.

We ourselves sold during 1927, 2,031 ranges, and estimate that dealers sold at least 600, making a total addition to our lines of approximately 2,631 ranges. We are setting our quota for 1928 at 2,500 ranges and with dealer sales the sales for 1928 will likely reach a figure of approximately 3,200 ranges.

We sold during 1927 150 water heaters. At the present time we are not setting any definite quota for 1928, but will push aggressively water heating sales throughout the year.

During 1927 we sold 240 refrigerators in our territory, and we are setting a bogey for 1928 of 500 machines.

We are very optimistic here for 1928, and although our merchandise sales for 1927 were considerably in excess of those for 1926, we believe that in 1928 we will again materially exceed 1927, and are looking forward to pushing our gross merchandise sales to more than a million dollars for the year 1928.

In considering our merchandise sales activities, both past and future, you should keep in mind the fact that we sell all merchandise at retail list prices, this for the reason that we believe our merchandising business should "pay its way" and that it should carry all costs, direct and indirect, and be so conducted as not to incur any burden whatever on the utility business. This then permits other merchants to sell electrical merchandise in competition with our stores, thereby materially increasing the sales outlet and in turn increasing the number of current consuming devices on our lines.

Sign Electrolytic Smelter

"The outstanding load contracted for in 1927 was that of the Sullivan Mining Company wherein a contract was signed providing for a 10,000-kw. electrolytic smelting load at Kellogg, Idaho, which will start operations early in 1928," says Lewis A. Lewis, sales manager, the Washington Water Power Company, Spokane, and adds:

We have increased in customers from 44,522 to 46,725 and our maximum peak load increased from 103,780 kw. to 112,520 kw., an increase of 8 per cent, while the total kilowatt-hours generated and purchased increased from 566,000,000 to 628,000,000 or an increase of 11 per cent.

A number of extensions were made in rural communities and some irrigation load added thereby.

Reporting only for the City of Spokane, the kilowatt-hours consumed per residence increased from 617 for 1926 to 676 for 1927, or an increase of 9.6 per cent. This year 1,124 electric ranges were added to the system and 1,084 water heaters. In addition to these figures, approximately 200 electric ranges and water heaters were installed by dealers. We have set as our quota for 1928 1,000 electric ranges and about 900 electric water heaters.

We have no figures on refrigerator sales but know that it has been active and the prospects are that the next year will be much more active than the past.

Merchandising was very much more active than in 1926, so far as the number of pieces and additional load added are concerned, but due to the decided decrease in the price of electrical merchandise we anticipate that the net results of gross merchandise sales will be somewhat less than for 1926. At this time, it would appear that we sold at least 20 per cent more pieces of electrical merchandise than in 1926.

We do not anticipate any extraordinary campaigns in 1928. We will tie in closely with the national merchandising campaigns and continue actively in the sale of ranges and water heaters. We will devote especial attention to heavy-duty cooking and an added effort will be given to commercial lighting. We do not anticipate entering the residential re-lighting campaign, but will very likely tie in with the electrical dealers.

Feels Year Will Be a "Winner"

An infectious optimism prevails in every word of the letter of J. A. Clay, general manager, The Western Colorado Power Company, Durango, Colo., as he describes his company's merchandising and load building activities in the face of stagnant mining conditions in the district served by the company, largely dependent upon mining operations. The courageous outlook of this progressive little company makes a fitting climax for this symposium of commercial retrospect and expression of ambitions for the year. Mr. Clay's letter in itself is a mine of inspiration to the commercial manager. He declares:

We feel that the year 1927 was a good one for us, and we are confident that the new year, already rolling along, will likewise be a winner.

Before going into detail regarding growth in consumers and load over our territory, I believe it would be well to consider that three of the districts being served by us are strictly mining districts, while two others are strictly agricultural districts, and the sixth, Durango, is supported by agriculture, mining and a smelting plant.

There has been no growth in consumers and load in the mining districts during the past year, but we have enjoyed a slight gain in the strictly agricultural districts, and a notable gain in the district supported by agriculture, mining and smelter. The growth in our districts is set forth in the tabulation below.

	Total No. Consumers			Total Con. Load kw.			Residential kw.-hr. Sold per Customer		
Agrl. Dist.	Nov. 1926	Nov. 1927	% Gain	Nov. 1926	Nov. 1927	% Gain	Nov. 1926	Nov. 1927	% Gain
Delta	921	924	.3	1,955	2,130	8.9	31.2	34.5	10.5
Montrose	1,546	1,575	1.8	2,587	2,719	5.1	28.1	30.2	7.4
Mining Dist.									
Telluride	648	624	**3.7**	4,061	4,144	2.0	89.2	75.9	**15.0**
Ouray	508	508		1,239	1,313	6.0	73.0	70.9	.3
Silverton*	13	7		4,614	2,997		No residential		
Ag., Mg. & Smelt.									
Durango	1,932	2,145	11.0	5,100	5,613	10.5	42.5	54.3	12.8

Bold face figures indicate decrease.
* We do not retail service in Silverton; customers are mining companies.

In Oct., 1926, we entered the Rico district to serve the mining industry there, and connected approximately 850 kw. to our lines at that time. We served only a few mining customers until February, 1927, when we took over the distribution system and added approximately 160 customers with connected load of 200 kw. Our reports for Nov., 1927, disclose that we now have 168 customers and a total connected load of 1,120 kw. in this district, which is also a mining camp.

Merchandise activities during the year 1927 resulted in the sale of approximately 110 electric ranges, 70 electric refrigerators, 170 washing machines, 10 ironing machines, and practically all other items under the head of appliances and supplies showed a substantial gain over sales in 1926.

The largest number of electric ranges sold in the Durango territory is undoubtedly responsible for the healthy gain of 12.8 kw.-hr. sold per month to residential customers in November, 1927, over Nov., 1926.

Every sales campaign conducted during the year was a success, and in only one case did we fail to reach our quota.

Merchandise sales plans for 1928 provide for intensive campaigning on ranges and refrigerators each month in the year, lighting fixtures at least one month, our annual washing machine campaign in March, and tying in with N.E.L.A. outline of lamp socket appliance campaigns.

We estimate 120 electric ranges were added to our lines during the year. This allows for what few might have been sold in the territory by other dealers. Our quota for 1928 has not been set yet, but we expect it to be about the same as it was in 1927, namely 100.

We estimate 60 electric water heaters were connected during 1927, and our quota for 1928 is about 50.

We actually sold and connected to our lines during 1927 70 electric refrigerators, and we estimate that 20 more were sold in our territory by other agencies, making a total of 90 connected during the year. Our quota for 1928 will be about 75 machines.

Conditions generally during the year 1927 were good, but heavy rains which caused railroad and highway washouts during the summer and early fall caused a slight depression which had just about disappeared before the year ended. The outlook for 1928 is good and we expect continued growth in Durango, Montrose and Delta territories, with mining territories of Silverton, Telluride, Ouray and Rico holding their own throughout the year.

Chelan plant of The Washington Water Power Company.

Hydro and Steam Developments Will Set New Records During 1928

HYDRO-ELECTRIC and steam plant construction during 1927 resulted in the addition of 222,333 kva. to the lines of the electric light and power companies serving the eleven Western states. Of this amount 196,083 kva. were developed in new hydro-electric plants and only 26,750 kva. in steam generating stations. These figures compare with 227,105 kva. in 1926 of which 116,855 kva. were hydro and 110,250 kva. were steam. At the close of 1927 the installed capacity of the central stations serving this territory was 3,824,161 kva. Expenditures for all classes of new construction, including generating stations, transmission and distribution facilities were $107,208,000 for 1927 as compared with $170,132,000 in 1926. The 1928 budgets total $128,890,000. A classification of expenditures for system additions and extensions for the Western states is given in Tables I and II.

CONSTRUCTION by central stations resulted in the addition of 222,333 kva. in new capacity during 1927. Total expenditures for extensions and betterments were $107,208,000. Additions in 1928 will set a new record with 502,785 kva. Budget for the year is $128,890,000.

A study of the programs under way at the present time indicates that 1928 will be the greatest year in the history of the electric utilities from the standpoint of new capacity added, even exceeding the record year, 1925. During the coming months there will be added to the lines of the central stations 502,785 kva. in new capacity, 286,535 kva. being in hydro stations and 216,250 kva. in new steam plants. The 1925 additions, which hitherto held the record, were 402,125 kva.

Analysis of figures below shows that during 1926 and 1927 the various utilities had caught up with the demands imposed upon them following rapid development after the war through intensive construction programs in 1923, 1924 and 1925. New uses for power, increased demands from old consumers and territorial growth have necessitated another large increase in generating capacity with the result that 1928 will set a new record for additions. It is interesting to note that approximately one-third of the new capacity added during this five-year period has been steam. Based upon future plans of the various companies it is reasonable to believe that this percentage will increase to a point where new capacity will be divided equally between steam and hydro. The following table shows the increases in installed capacity for the five-year period 1924-1928:

Year	Hydro (kva.)	Steam (kva.)	Total (kva.)
1924	243,223	139,500	382,723
1925	314,625	87,500	402,125
1926	116,855	110,250	227,105
1927	196,083	26,750	222,833
1928	286,535	216,250	502,785
Totals	1,157,321	580,250	1,737,571
Average for five-year period			347,514

1927 Hydro Projects

Hydro capacity added during the year resulted from nine new stations and three installations consisting of

TABLE I—VALUE OF ADDITIONS AND EXTENSIONS TO WESTERN POWER SYSTEMS, 1922-1928

	1922	1923	1924	1925	1926	1927	1928
Hydro-electric Generating Stations	$ 26,160,000	$ 38,800,000	$ 37,980,000	$ 55,000,000	$ 45,000,000	$ 21,497,000	$ 24,023,000
Steam-Electric Generating Stations	5,373,000	4,292,000	13,100,000		25,000,000	13,711,000	19,142,000
Transmission Systems	21,598,000	20,630,000	19,790,000	45,300,000	60,000,000	22,121,000	24,768,000
Distribution Systems	22,855,000	38,940,000	38,310,000	15,000,000	40,132,000	49,878,000	60,957,000
Total	$ 75,986,000	$102,662,000	$109,180,000	$140,300,000	$170,132,000	$107,207,000	$128,890,000

Some Additions to Hydroelectric Generating

No.	COMPANY	PLANT	LOCATION	DAMS			CANALS AND TUNNELS			PENSTOCKS			HEAD (Ft.)	
				Type	Reservoir Capacity (Acre-ft.)	Height (Ft.)	Type	Dia. (Ft.)	Length (Ft.)	Dia.	Length (Ft.)	Type	Static	Effective
(1)	British Columbia Electric Railway Company, Ltd.	Alouette	35 miles east of Vancouver, B.C.	Earth Fill	170,000	63	Tunnel	12x16	3,550	13′ 12′	.....	Conc. Rivtd.	97–166	133 Av.
(2)	British Columbia Electric Railway Company, Ltd.	Bridge River	Seton Lake, B.C.	.....	.....	.....	Tunnel	13	13,200	.....	2,100	.....	1,200	1,150
(3)	City of Seattle Lighting Department	Reflector Bar	Skagit River	Concr. Arch	87,500	385	Tunnel	.....	2,000	.....	.....	.....	325	320
(4)	City of Seattle Lighting Department	Cedar River 6th Unit	Cedar River, Wash.	†	†	†	Wood Pipe	78″	7,000	78	1,000	Rivtd.	600	590
(5)	Northwestern Power and Light Company	Glines Canyon	Elwha River near Port Angeles, W.	Concr. Arch	40,000	200	Pressure Tunnel	13x14	575	11′6″ 10′	450	Rivtd.	180	180
(6)	City of Aberdeen	Wynooche	Wynooche River, Wash.	Arch	.....	240	.....	.....	.....	.....	.....	.....	.....	.....
(7)	Chelan Electric Company (Sub. Washington Water Power Co.)	Chelan	Chelan Lake and River, Wash.	Gravity	640,000	39	Concrtd. Tunnel	14	10,694	14-12′6″ 2- 8′10″	986 116	Rivtd.	374–395	364–385
(8)	Portland Electric Power Company	Station "M"	River Mill near Estacada, Ore.	†	†	†	†	†	†	†	†	†	.....	81
(9)	Inland Power & Light Company (Sub. Pacific Power & Light Co.)	Lewiston	Clearwater River near Lewiston, Ida.	Gravity	550	45	None	.....	.....	.....	None	.....	20–35	20–35
(10)	Idaho Power Company	American Falls 3rd and 4th Units	American Falls, Ida.	†	†	†	None	.....	.....	.....	None	.....	.....	48
(11)	U. S. Bureau of Reclamation	Minadoka 6th Unit	Near Rupert, Ida.	†	†	†	None	.....	.....	10′	46	Rivtd.	47	46
(12)	U. S. Bureau of Reclamation	Guernsey	Guernsey, Wyo.	Earth Fill	72,700	108	Tunnel	30 12	711 613	8′6″	.....	Rivtd.	Var.	50–90
(13)	Great Falls Power Company (Sub. Montana Power Company)	Black Eagle	Great Falls, Mont.	Concr.	1,000	10	Canal	90x25	420	15′	40	Rivtd.	51	50
(14)	Utah Power & Light Company	Cutler	Bear River, Utah	Concr. Arch	17,060	125	Steel Pipe	18	1,165	14′	117	Rivtd.	127	123
(15)	Dixie Power Company	No. 3	Washington County, Utah	Earth Fill	1,580	47	Canal Wood Pipe	3x10 24-42″	30,000 15,600	26-30″	2,051	Weld.	411	390
(16)	Salt River Valley Water Users' Association	Horse Mesa	Salt River, Ariz.	Arch	245,138	300	None	.....	.....	10′	50	Rivtd.	264	262
(17)	Salt River Valley Water Users' Association	Stewart Mountain	Salt River, Ariz.	Arch	80,000	180	None	.....	.....	12′	60	Rivtd.	110	108
(18)	The California Oregon Power Company	Prospect No. 2	North Fork Rogue River, Ore.	Gravity	Diversion	35	Concr. Canal 2-Wood Pipes	7′-3″	6,900 3,000	7′3″-6′	1,000	Rivtd.	600	590
(19)	Pacific Gas and Electric Company	Melones	Stanislaus River, Calif.	Concr. Arch	103,500	210	Pressure Tunnel	14′9″-12′	4,940	8′6″	112	Rivtd.	230 Var.	228 Var.
(20)	Pacific Gas and Electric Company	Spaulding No. 1	Nevada County, Calif.	†	†	†	Tunnel	8′ 8″	950	.....	None	.....	196	190 Var.
(21)	Pacific Gas and Electric Company	Spaulding No. 2	Nevada County, Calif.	†	†	†	Tunnel	8′ 8″	839	48-36″	239	Rivtd.	344	335 Var.
(22)	Pacific Gas and Electric Company	Spaulding No. 3	Nevada County, Calif.	None	.....	.....	None	.....	.....	66″	1,650	Rivtd.	304	289
(23)	Pacific Gas and Electric Company	Drum	Placer County, Calif.	†	†	†	†	†	†	72-52″	3,775	Rivtd.	1,375	1,280
(24)	Pacific Gas and Electric Company	Salt Springs	Mokelumne River, Calif.	Rock Fill	130,000	300	.....	.....	.....	.....	.....	.....	.....	.....
(25)	Pacific Gas and Electric Company	Tiger Creek	Mokelumne River, Calif.	Rock Fill	130,000	300	Tunnels Canal	.....	111,600	.....	.....	.....	1,247	.....
(26)	Feather River Power Company	Bucks Creek	Feather River, Calif.	Rock Fill 2-Arch	103,000	115 85	Pressure Tunnels	6x8 8x8	5,700 9,670	54-36″	4,715	Rivtd. Weld.	2,548	2,368
(27)	American River Hydroelectric Company	Folsom	American River, Calif.	Gravity	325,000	185	Tunnel	20x20	2,000	.....	.....	Rivtd.	.....	225
(28)	San Joaquin Light & Power Corporation	Balch	Kings River, Calif.	Concrete Diversion	180	55	Tunnel	12x12	19,600	60-34″	4,882	Weld. Banded	2,381	2,243
(29)	Turlock and Modesto Irrigation Districts	Don Pedro 3rd and 4th Units	Tuolumne River, Calif.	†	†	†	None	†	†	72″	.....	Conc.	Var.	130–280
(30)	Southern California Edison Company	Big Creek 2A	Big Creek, Calif.	Gravity	138,000	188	Tunnel	8x11	13,600	96-34″	6,800	Rivtd. Weld. Forged	2,420	2,290
(31)	Southern California Edison Company	Big Creek 8 Second Unit	Big Creek, Calif.	.....	.....	.....	.....	.....	.....	120-80″	2,700	.....	715	680
(32)	Los Angeles Bureau of Power & Light	Haiwee	Inyo County, Calif.	Earth Fill	63,000	.....	.....	.....	.....	8′ 8″ 7′ 6″	9,600	Rivtd.	190	155 Normal
(33)	Yuma County Water Users' Association	Laguna	Near Yuma, Ariz.	†	†	†	None	.....	.....	None	.....	.....	16	16

Plants in the Eleven Western States 1927-1928

PRIME MOVERS			GENERATING UNITS			PLANT CAPACITY (kw.)		TRANSFORMERS	TRANSMISSION LINES			PRESENT STAGE OF DEVELOPMENT	ESTIMATED COST	No.
No.	Capacity (hp.)	Maker	No.	Capacity (kva.)	Maker	Present or Proposed	Ultimate		Length (Miles)	Voltage (kv.)	Type			
1	12,500	E. E.*	1	10,000	E. E.*	9,000	9,000	3-3,000 Kva.	10.5	60	Wood Pole	To be completed March, 1928	$2,250,000	(1)
2	27,000	.....	2	22,500	.....	40,000	520,000	.....	130	165	.....	Tunnel construction started	.....	(2)
.....	.....	.....	2	30,000 kw.	.....	60,000	180,000	.....	120	165	.....	Dam to be built in 1928	8,450,000	(3)
1	18,000	Pelt.	1	14,285	.....	38,000	45,000	3-6,600/60,000 volt	†	†	†	To be completed October, 1928	600,000	(4)
1	17,500	Pelt.	1	13,333	G. E.	10,000	10,000	3-4,500 Kva. G. E. 6,600/66,000 volt	7	66	Wood Pole	Completed, 1927	1,500,000	(5)
.....	.....	.....	.....	.....	.....	21,000	.....	.....	30	.....	.....	Bonds voted	2,700,000	(6)
1	34,000	I. P. M.	1	30,000	G. E.	24,000	96,000	4-10,000 Kva. West. 11,000/110,000 volt	.....	.....	.....	First unit completed September, 1927	10,000,000	(7)
1	6,825	S. M. S.	1	4,150	G. E.	14,000	14,000	1-3,667- Kva. G. E.	†	†	†	Completed December, 1927	70,000 (wheel only)	(8)
2	7,500	S. M. S.	2	6,250	A.-C.	10,000	10,000	2-6,250 Kva. G. E.	4.5	66	Wood pole	Completed January, 1928	3,000,000	(9)
2	9,000	A.-C.	2	7,500	A.-C.	27,000	27,000	4-11,250 Kva. G. E.	81	132	Wood Pole	Completed, 1927	800,000	(10)
1	3,500	N. N. S.	1	3,000	A.-C.	10,000	10,000	4-1,000 Kva.	11	33	Wood Pole	Completed June, 1927	230,000	(11)
1 1	3,400 3,400	S. M. S. N. N. S.	2	3,000	G. E.	6,000	12,000	6-1,000 Kva. G. E.	133	33	Wood Pole	First unit completed (second under construction)	713,000	(12)
3	9,000	S. M. S.	3	7,000	A.-C.	16,800	16,800	†	†	†	†	Completed July, 1927	2,000,000	(13)
2	21,500	I. P. M.	2	18,750	G. E.	30,000	30,000	3-8,333 Kva. G. E. 6,600/130,000 volt	80	130	.....	Completed June,1927	5,000,000	(14)
1	1,200	.....	1	800	G. E.	2,300	4,400	4-250 Kva. G. E.	4.5	33	Wood Pole	Completed April, 1927	150,000	(15)
3	15,280	S. M. S.	3	11,100	G. E.	30,000	30,000	10-3,700 Kva. G. E. 11,000/110,000 volt	5	110	Steel Tower	Completed, 1927	4,200,000	(16)
.....	.....	.....	.....	.....	.....	8,600	8,600	3-10,000 Kva.	13	44	.....	Proposed	2,500,000	(17)
2	23,400	Pelt.	2	20,000	G. E.	46,800 hp.	70,200 hp.	6-6,666 Kva. West 6,600/73,000 volt	74	132	Wood Pole	To be completed early in 1928	3,200,000	(18)
2	17,000	S. M. S.	2	13,500	West.	20,000	20,000	4-9,000 Kva. West.	7.5	104	Steel Tower	Completed June, 1927	2,500,000	(19)
1	10,000	Pelt.	1	8,000	G. E.	6,400	6,400	4-4,000 Kva. A.-C. 2,300/60,000 volt	†	†	†	50 per cent completed	471,000	(20)
1	5,300	Pelt.	1	3,750	G. E.	3,000	3,000	None		None		60 per cent completed	203,000	(21)
1	8,000	Pelt.	1	7,000	West.	5,600	5,600	4-2,500 Kva. A.-C. 6,600/60,000 volt	2	60	Wood Pole	Work postponed one year	535,000	(22)
1	18,000	Pelt	1	15,000	A.-C.	52,500	52,500	3-5,500 Kva. 5,500/125,000 volt	†	†	†	To be completed July, 1928	860,000	(23)
.....	.....	.....	.....	.....	.....	9,000	9,000	.....	.....	.....	.....	Dam under construction	.....	(24)
.....	.....	.....	.....	.....	.....	54,000	54,000	.....	.....	.....	.....	Dam under construction	.....	(25)
2	30,000	Pelt.	2	25,000	G. E.	40,000	40,000	7-8,333 Kva. G. E. 11,000/240,000 volt	108	220	Steel Tower	To be completed early in 1928	6,500,000	(26)
Being Designed			Being Designed			30,000	30,000	To be furnished by P. G. and E. Co. which has contracted for power.				Construction to start in 1928	8,000,000	(27
1	42,200	A.-C.	1	33,000	G. E.	31,500	124,000	4-11,000 Kva. G. E. 13,200/132,000 volt	39	132	Steel Tower	Completed February, 1927	4,142,119	(28)
2	10,000	S. M. S.	2	7,500 kw.	A.-C.	30,000	30,000	.....	†	†	†	50 per cent completed	755,000	(29)
1 1	56,000 56,000	A.-C. Pelt.	2	45,000	West.	80,000	80,000	4-30,000 Kva. G. E.	6.5	220	Steel Tower	To be completed July, 1928	18,000,000	(30)
1	44,000	.....	1	35,000	.....	55,000	55,000	4-20,000 Kva. G. E.	†	†	†	Construction proposed 1928	.....	(31)
2	3,400	S. M. S.	2	3,500	G. E.	5,600	.....	4-2,333 Kva. G. E.	2.5	33	Wood Pole	Completed, 1927	752,000	(32)
3	3,000	.....	3	2,500	.....	7,500	7,500	4-2,500 Kva.	9	33	Wood Pole	Proposed	1,700,000	(33)

†Existing structures will be used.

*Abbreviations used are: E. E., English Electric Company; A.-C., Allis-Chalmers Manufacturing Company; G. E., General Electric Company; West., Westinghouse Electric & Manufacturing Company; Pelt, Pelton Water Wheel Company; I. P. M., I. P. Morris Department William Cramp & Sons Ship & Engine Building Company; W. S. M., Wellman-Seaver-Morgan Company; S. M. S., S. Morgan Smith Company; N. N. S., Newport News Shipbuilding & Drydock Company

Some Additions to Steam Electric Generating

	COMPANY	PLANT	LOCATION	BOILERS No.	BOILERS Type	BOILERS Capacity (hp.)	BOILERS Maker	FUEL	PRIME MOVERS No.	PRIME MOVERS Capacity (hp.)	PRIME MOVERS Maker
(1)	Portland Electric Power Company.....	Station "L"	Portland, Ore.	1	Water Tube	1,670	B. & W.*	Hogged Fuel		None Added	
(2)	New Mexico Power Company.....	Dawson	Dawson, N. M.	1	Stirling	710	Heine	Pulverized Coal	1	5,000 kva.	West.
(3)	Albuquerque Gas & Electric Company...	Bernalillo	Bernalillo, N. M.	1	Water Tube	901	Springfield	Wood Refuse	1	5,000 hp.	West.
(4)	Southern California Edison Company....	Long Beach No. 3	Long Beach, Calif.	3	Cross Drum Stght. Tube	....	B. & W.	Gas and Oil	1	94,000 kw.	G. E.
(5)	Los Angeles Gas and Electric Corporation.	Seal Beach	Seal Beach, Calif.	3	Cross Drum	2,556	B. & W.	Oil and Gas	1	46,000 hp.	G. E.
(6)	Pasadena Municipal Light & Power Department.....	Glenarm St.	Pasadena, Calif.		No Additional			Oil and Gas	1	20,000 hp.	.....
(7)	Los Angeles Bureau of Power & Light....	Harbor	Los Angeles, Calif.	3	Water Tube	....	.....	Oil and Gas	1	36,000 hp.	.....
(8)	Pacific Gas and Electric Company.....	Station "C"	Oakland, Calif.	2	Cross Drum	3,545	B. & W.	Oil	1	37,500 kw.	G. E.
(9)	Western States Gas & Electric Company (a)	Station "B"	Eureka, Calif.	..	.....	....	.....	Hogged Fuel	1	4,000 kw.	Am. B. B.
(10)	San Diego Consolidated Gas & Electric Company.....	Station "B"	San Diego, Calif.	..	.....	....	.....	Oil	1	25,000 kw.	.....

*Abbreviations:—B. & W., Babcock & Wilcox Company; G. E., General Electric Company; Heine, Heine Boiler Company; West., Westinghouse Electric & Manufacturing Company; Am. B. B., American Brown Bouveri Company; Springfield, Springfield Boiler Company.
(a) Subsidiary, Pacific Gas and Electric Company.

additional units in existing plants. Foremost among the hydro plants is the Balch power house of the San Joaquin Light & Power Corporation, the first of a series of three plants in California that will utilize heads considerably higher than has heretofore been common practice in America. (See ELECTRICAL WEST, May 1, 1927, p. 253.) In the Intermountain region the Cutler plant of the Utah Power & Light Company adds to the chain of generating stations utilizing the waters of the Bear River. But two more sites remain on this stream before its power possibilities will have reached maximum development. The Cutler project (See ELECTRICAL WEST, Nov. 1, 1927, p. 255) combines power generation with water regulation and irrigation. The Horse Mesa plant of the Salt River Valley Water Users' Association, Arizona, shows the tendency toward the full

TABLE II—SEGREGATION OF EXPENDITURES FOR TRANSMISSION AND GENERATION

Year	Total Construction Budgets for Year	Total Expenditures for Generating Plants	Total Expenditures for Transmission and Distribution	Per Cent of Total for Generating Plants	Per Cent of Total for Transmission and Distribution
1922	$ 75,986,000	$31,533,000	$ 44,453,000	41.5	58.5
1923	102,662,000	33,092,000	59,570,000	32.2	67.8
1924	109,180,000	51,080,000	58,100,000	46.8	53.2
1925	140,300,000	80,000,000	60,300,000	57.0	43.0
1926	170,132,000	70,000,000	100,132,000	40.9	59.1
1927	107,207,000	35,208,000	71,999,000	32.8	67.2
1928*	128,890,000	43,165,000	85,720,000	33.4	66.6

* Budget estimates.

utilization of both the irrigation and power possibilities of the streams of the West. This is the third link of an extensive project for utilization of the waters of the Salt River. A fourth storage dam with its power plant as an adjunct has been proposed for this river.

The Melones plant of the Pacific Gas and Electric Company (See ELECTRICAL WEST, Oct. 1, 1927, p. 218) is a striking example of the benefits of co-operation between power and irrigation interests. Low-head, foothill hydro-electric developments are not financially attractive today in competition with the lower construction and operating costs of steam. However, foothill storage and control of water for irrigation and related purposes are of increasingly vital importance to the agricultural and commercial development of many large and fertile areas. The terms of agreement as carried out in the case of the Melones project whereby the fullest possible use is made of the by-product power from a large irrigation project, are of importance to many districts of the West.

Chief of the important hydro-electric developments completed in the Pacific Northwest during the past year is the Chelan plant of the Washington Water Power Company. With an initial installed capacity of 30,000 kva. this project has an ultimate capacity of 96,000 kw. backed up by a water supply of 640,000 acre-ft. made available by a 39-ft. dam at the point where the Chelan River leaves Lake Chelan. Considerable interest attaches to the Glines Canyon plant of the Northwestern Power & Light Company on the Elwha River on the Olympic Peninsula. This plant, with a single 13,333-kva. unit installed, is the largest fully automatic station in the country. It supplies power for the mills of the Washington Pulp & Paper Company. Still another interesting hydro-electric development in the Northwest is the Black Eagle plant of the Montana Power Company at Great Falls on the Missouri River. The three 9,000-hp. propeller type wheels are the largest turbines of this type yet to be constructed. Two 7,500-kva. units were added to the American Falls plant of the Idaho Power Company on the Snake River. The balance of the additions to the hydro capacity of the West are included in the accompanying table, which also gives details on all of the projects mentioned.

1927 STEAM PLANT CONSTRUCTION

There were no notable additions to steam capacity in 1927 with the exception of the unit installed in Station "B" of the San Diego Consolidated Gas & Electric Company. A small plant utilizing hogged fuel was completed at Bernalillo, N. M., and a 5,000-kw. unit was installed in the old Western States Gas & Electric steam plant at Eureka, Calif.

HYDRO-ELECTRIC CONSTRUCTION FOR 1928

Reference to the table showing construction over the five-year period 1924-1928 shows that only in 1925 was there more hydro capacity added in the West than

Stations in the Eleven Western States, 1927-1928

GENERATORS			PLANT CAPACITY (kw.)		TRANSFORMERS	TRANSMISSION LINE			PRESENT STATUS	ESTIMATED COST	
No.	Capacity (Kva.)	Maker	Present or Proposed	Ultimate		Length (Mi.)	Voltage (Kv.)	Type			
	None Added		42,500	.....	2-10,000-kva. G.E.	1,360′	66	Wood Pole	Completed December, 1927	$3,410,250	(1)
1	5,000	West	5,000	10,000	3-1,500-kva. West.	.....	..	.....	60 per cent completed	400,000	(2)
1	3,750	West.	3,000	.....	3-1,000-kva. West.	17	44	Wood pole	Completed, 1927	225,000	(3)
1 1	90,000 kw. 4,000 kw.	G. E. G. E.	90,000	800,000	4-33,333-kva. West. 16.5/220 kv.	.....	..	.....	To be completed July, 1928	7,000,000	(4)
1	43,750	G. E.	70,000	210,000	3-15,000-kva. G. E.	†	†	†	Proposed, 1928	2,000,000	(5)
1	15,000	.....	34,500	34,500	.....	†	†	†	To be completed March, 1928	712,000	(6)
1	31,250	.....	30,000	.....	.....	.....	..	.....	Proposed	.....	(7)
1	37,500	G. E.	62,000	62,000	.....	.....	..	.....	To be completed early in 1928	2,640,000	(8)
1	5,000	Am. B. B.	9,000	9,000	.....	†	†	†	Completed December, 1927	67,765	(9)
1	25,000	.....	60,000	60,000	....	.....	..	.....	Proposed, 1928	.....	(10)

will be added in 1928. In the former year two of the largest plants in the West, Pit No. 3 and Moccasin Creek, were completed. During the coming year the major portion of the power will be in three new stations. The most notable is the 90,000-kva. Big Creek No. 2A station of the Southern California Edison Company where power will be developed in two units operating under a head of 2,420 ft. (static). The development of the water supply for this plant will make possible the installation of additional units in other Edison stations of the Big Creek-San Joaquin chain and already plans have been announced for a new unit in power house No. 8.

Joining the Balch and Big Creek 2A plants in the category of extremely high-head developments will be the Bucks Creek plant of the Feather River Power Company where two 25,000-kva. units will operate under a static head of 2,548 ft. Construction on this plant is being carried on during the winter months despite the difficulties incident to deep snows so that power may be ready for delivery at the earliest possible date.

The third large block of hydro power to be made available during the year will come from the Prospect No. 2 plant of the California Oregon Power Company. Water from the Rogue River is being utilized under a head of 600 ft. to generate 40,000 kva. Provision has been made in this plant for the installation of a third unit at a later date.

The tendency toward automatic operation of smaller stations where circumstances permit is shown by the reconstruction of the Spaulding No. 1 and No. 2 plants of the Pacific Gas and Electric Company on the Yuba River system. Water that is to be made available for these plants and Spaulding No. 3 has permitted the installation of a fourth unit in the Drum station.

Both the City of Seattle Light Department and the Los Angeles Bureau of Power & Light are using head resulting from the development of a domestic water supply to generate additional power. A 14,285-kva. unit is being installed in the Cedar River station of the City of Seattle while a 25,000-kva. unit is being added to the San Francisquito No. 1 plant of the Bureau of Power & Light.

In British Columbia the B.C. Electric Railway Company, Ltd., will complete the 10,000-kva. Alouette plant, and will continue active construction work on the first unit of the Bridge River plant. The Inland Power & Light Company completed the Lewiston project of the Clearwater River in Idaho during January. An important irrigation by-product power installation in California will be completed by the Turlock and Modesto Irrigation Districts.

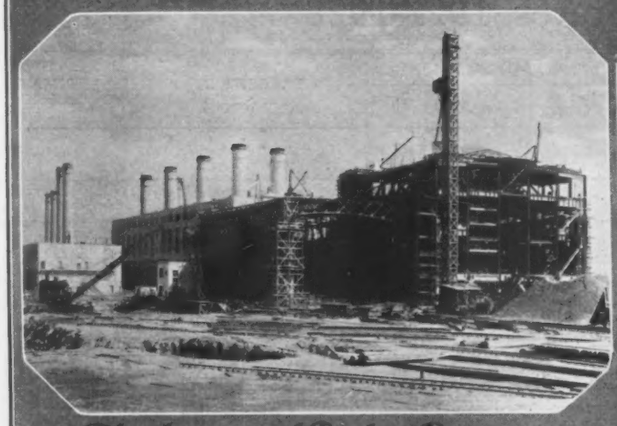
Steam Plant Construction During 1928

More steam capacity will be added to Western generating systems during 1928 than in any previous year. Initial units in two new stations and additional units in three other stations will account for 216,250 kva. Foremost among the steam plants is Long Beach No. 3 of the Southern California Edison Company where a 90,000-kw. unit, the largest single-shaft machine yet to be built, is being installed. The ultimate capacity of this station will be 800,000 kw. and a second unit has already been ordered from the manufacturer. The expected capacity of the three Edison plants at Long Beach will be in excess of 1,000,000 kw. The boilers in the new station are designed to burn pulverized coal as well as oil and natural gas.

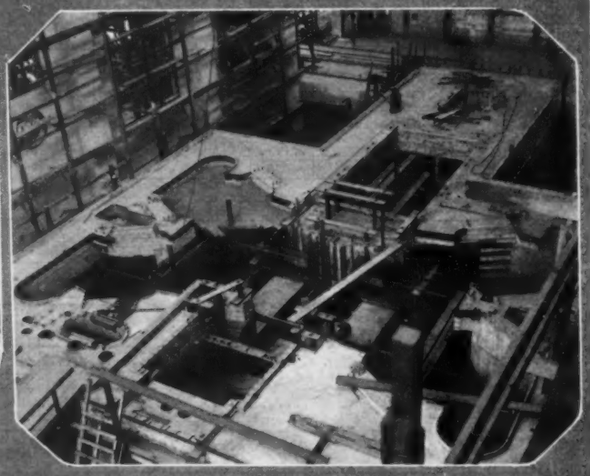
A second unit of 43,750-kva. capacity will be added during the year to the Seal Beach station of the Los Angeles Gas and Electric Corporation. This station has already earned an enviable record for operating economy and even better efficiencies are expected when the new unit is placed in operation. The Pasadena Lighting Department will place a 15,000-kw. unit in the present Glenarm St. station while the Pacific Gas and Electric Company will complete the installation of a 37,500-kva. unit in Station "C" in Oakland, an important stand-by plant on its system. The remaining 5,000-kw. in new steam capacity will come from the Dawson plant of the New Mexico Power Company.

Looking ahead to 1929, announcement has been made by the San Diego Consolidated Gas & Electric Corporation that a 25,000-kw. unit will be added to Station "C."

Nothing definite can be reported regarding development of either the Colorado or the Columbia Rivers. Congress has yet to act on the Swing-Johnson Bill. Opinion is still divided as to the possibility of passage of this measure. In the meantime there has developed considerable agitation in the Northwest for the Umatilla Rapids project on the Columbia. There is also discussion regarding a large hydro development on the Pend Oreille River.



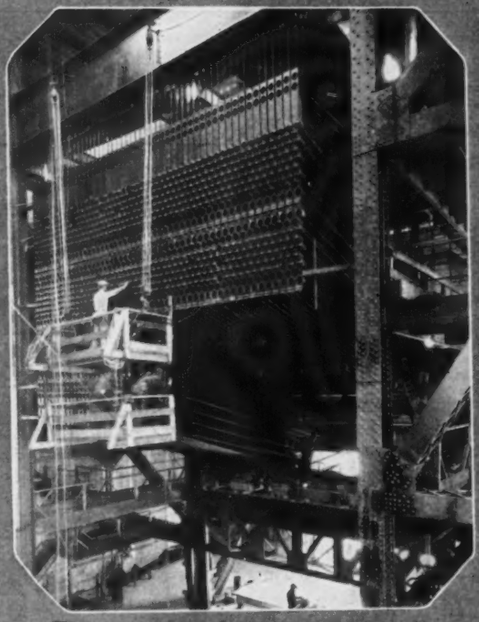
Turbine and Boiler Rooms



Turbine Foundation

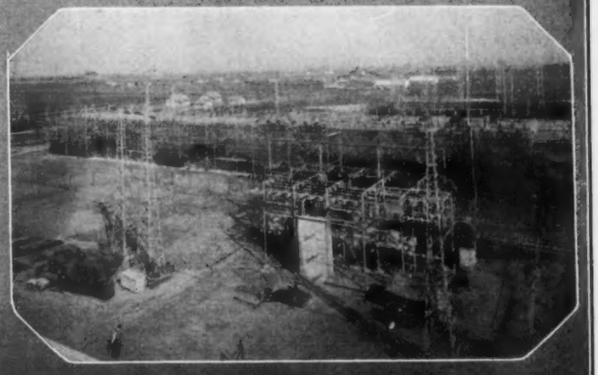
Steam-Electric Power for Southern California

PROVISION of additional generating capacity in steam plants is depicted in these views of the activities at the Long Beach steam plant of the Southern California Edison Company. The present "plant" in reality comprises two complete plants having a total effective capacity of 215,000 kw., with the third plant now under construction on the same property. This third plant is designed to accommodate eight 90,000-kw. generating units and is arranged for construction unit by unit as load requirements demand. The first of these large units is slated for completion in July, 1928, and inasmuch as the second generator is on order now, it is reasonable to expect that construction work will proceed practically without interruption on the second unit of the building. The No. 3 plant will be complete within itself, but its control is to be arranged so that it will constitute a co-operating unit with the two existing plants. Each of the four boilers serving each turbine will generate 450,000 lb. of steam per hour.



Part of one Boiler

Channel Crossing Towers



Part of Lighthipe Substation

Huntington-Shaver Siphon

Big Creek 2-A addition to present Plant 2

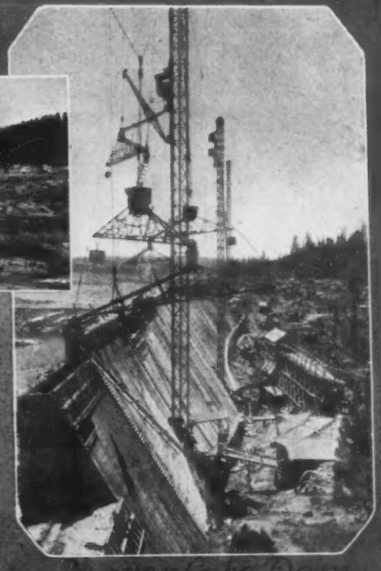
Part of Huntington-Shaver Siphon

Hydro-Electric Power for Southern California

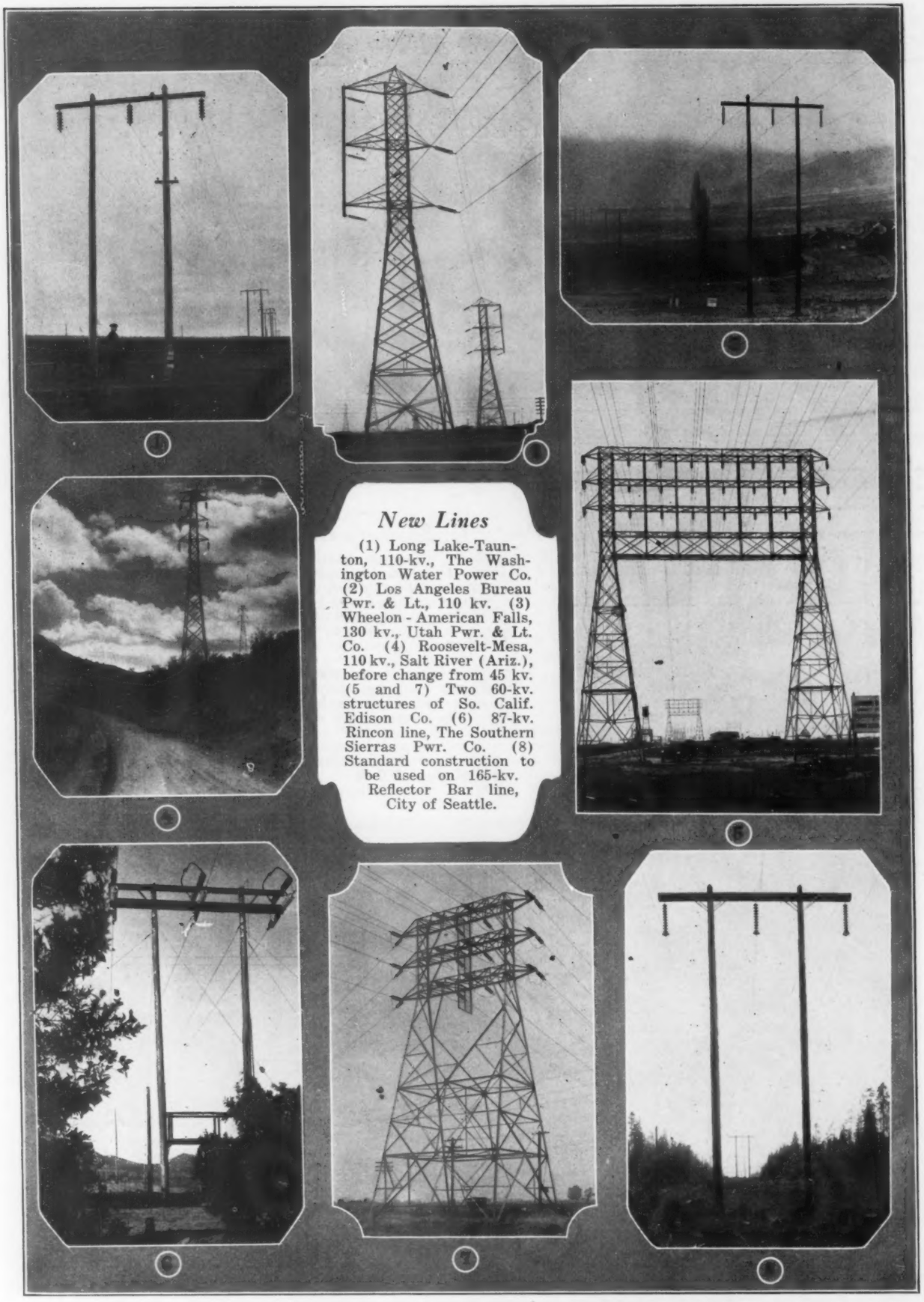
TO MAINTAIN a balance between hydro-electric and steam-electric generation and permit the greatest feasible utilization of water for power purposes, development work on the Big Creek-San Joaquin area is being continued by the Southern Cauifornia Edison Company. At the site of the present Big Creek No. 2 plant there is being constructed a power house known as Big Creek No. 2-A in which there are being installed two 40,000-kw., double-over-hung, impulse-driven generating units. The No. 2-A plant will draw its water from Shaver Lake, under an operating head of 2,419 ft. Shaver Lake itself was created on the site of an old and smaller lake by the erection of a concrete gravity section dam, having a maximum height of 188 ft. and a crest length of 2,222 ft. with a maximum base thickness of 123 ft. This reservoir covers an area of 2,224 acres and will provide an ultimate storage of 138,570 acre-ft. Shaver Lake has some natural drainage area, but will receive a large quantity of its water through a conduit line which connects it with Huntington Lake. The Big Creek syphon, one of the units of this conduit line is shown on this page, and gives an idea of some of the engineering necessary to the full conservation and efficient and ecnomic utilization of the potential hydro-electric power possibilities of this region. Big Creek syphon varies from 8 to 10 ft. in diameter, is some 2,500 ft. long and its lowest point is subject to a static head of about 376 ft.

Penstock right of way for Big Creek plant 2-A

Shaver Lake Dam from down stream side



Shaver Lake Dam during construction



New Lines

(1) Long Lake-Taunton, 110-kv., The Washington Water Power Co. (2) Los Angeles Bureau Pwr. & Lt., 110 kv. (3) Wheelon - American Falls, 130 kv., Utah Pwr. & Lt. Co. (4) Roosevelt-Mesa, 110 kv., Salt River (Ariz.), before change from 45 kv. (5 and 7) Two 60-kv. structures of So. Calif. Edison Co. (6) 87-kv. Rincon line, The Southern Sierras Pwr. Co. (8) Standard construction to be used on 165-kv. Reflector Bar line, City of Seattle.

Transmission Line Construction Sets New Record for 1927

TWO IMPORTANT interconnections were effected as part of the 1,363 circuit-mile transmission construction program of 1927. Between the systems of the Eastern Oregon Light & Power Company and the Idaho Power Company a tie has been completed through 73 miles of 66-kv. single-circuit line. The Oregon company built 57 miles of the line between Durkee and Union, Ore., while the Idaho company built the 16 miles from Durkee to Lime, Ore. The second interconnection occurred in Nevada where the Nevada Valleys Power Company built 36 miles of 60-kv. single-circuit line between its system at Lahontan Dam and the system of the Truckee River Power Company at Virginia City.

With these new lines interchange of power now is possible between central Nevada and California, and the already interconnected systems of Utah and Idaho are brought a step closer to a tie-in with the Coast systems. There is only a small gap between the Pacific Power & Light Company and the Eastern Oregon Power & Light Company in northern Oregon.

A comparison of the relative transmission construction activities for the past three years and those scheduled for 1928 is given in the following table which was prepared from the statistics submitted to ELECTRICAL WEST:

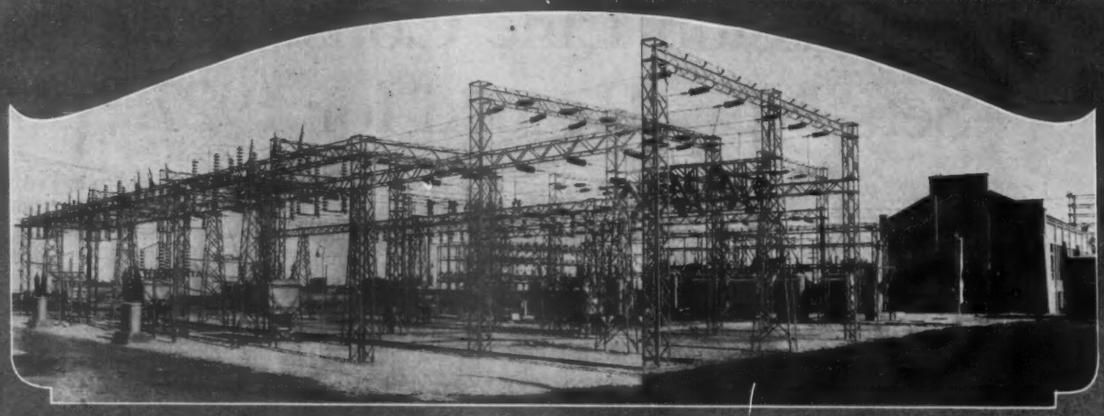
Line Potential (kv.)	1925	1926	1927	1928
33 to 50	132	326	246	31
55 to 70	356	151	524	311
85 to 110	436	385	93	165
132 to 165	197	0	163	120
220	17	235	338	25
Totals	1,138	1,097	1,364	652

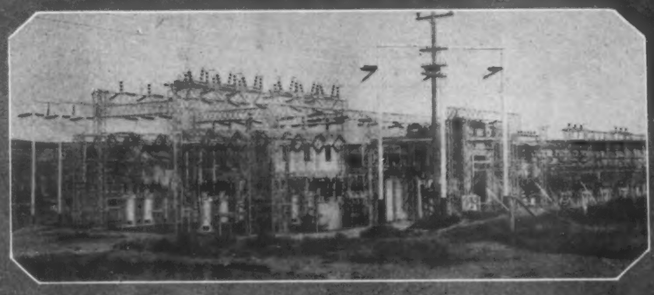
Some Additions to Transmission Systems in the Eleven Western States 1927-1928

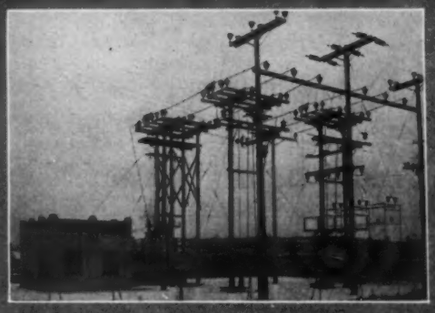
Company	Location	Length (Miles)	Voltage (Kv.)	No. of Circuits	Supports	Conductor	Insulators	Spans Aver. (Ft.)	Spans Max. (Ft.)	Status	Estimated Cost
Puget Sound Power & Light Company	Forest Mills to Beverly Park Sub	61.3	110	1	Wood poles	4/0 Copper or equivalent	.....	....	....	Proposed, 1928	$507,500
Puget Sound Power & Light Company	Beverly Park Sub to Jefferson St. Sub	25	55	1	Wood poles	4/0 Copper or equivalent	.....	....	....	Proposed, 1928	.....
City of Seattle Lighting Department	Reflector Bar to Seattle	120	165	1	Wood poles	300,000 c.m. Copper or equivalent	.....	600	2,000	Proposed, 1928	2,000,000
The Washington Water Power Company	Brewster to Okanogan, Wash.	22	60	1	Wood poles	7 str. No. 8 Copper An.*	5 suspension, 6 strain; J.D. and Hewlett*	365	1,020	Completed, 1927	.....
Portland Electric Power Company	Station "E" to St. Helens, Ore.	30	33	1	Wood poles	10.9 mi. 105,534 c.m. Al., bal. 1/0 Copper	O.B. 12552 and 9418 Locke 418	150	200	Completed, 1927	40,000 (11.1 mi.)
Portland Electric Power Company	Robbins Sta. to Hawley Pulp and Paper Co.	3.5	57	1	Wood poles	2/0 Copper	O. B. 12552	200	300	Completed, 1927	17,000
Eastern Oregon Light & Power Company	Durkee to Union, Ore.	57	66	1	Wood poles Stoddard*	7 str. No. 1 Copper An.	5 suspension, 6 strain O.B.	475	1,100	Under construction	200,000
Great Falls Power Company (a)	Malta to Glasgow, Mont.	70	50	1	Wood poles	3 str. No. 8 Copper An.	Pin type Pyrex	300	....	Completed, 1927	105,000
Idaho Power Company	American Falls to Shoshone Falls, Ida.	81	132	1	Wood poles Kaniksu	250,000 c.m. Copper An.	10 suspension No. 8401 Locke	600	1,180	Completed, 1927	600,000
Idaho Power Company	Lime to Durkee, Ore.	16	66	1	Wood poles Kaniksu	No. 1 str. Copper, An.	10 suspension West.	350	1,120	Completed, 1927	62,000
Idaho Power Company	Emmett, Ida.	1.5	66	1	Wood poles Kaniksu	No. 1 str. Copper	5 suspension West.	300	....	Completed, 1927	5,650
Utah Power & Light Company	Wheelon, Utah, to American Falls, Ida.	82	132	1	Wood poles	250,000 c.m. Copper An.	Suspension, 10 and 12 Locke 8401	612	1,350	Completed, 1927	750,000
U. S. Bureau of Reclamation	Lingle, Wyo., to Scottsbluff, Nebr.	58	33	1	Wood poles	No. 1 Copper	Pin type	250	....	Completed, 1927	.....
U. S. Bureau of Reclamation	Nyssa, to Owyhee Dam, Ore.	19.3	66	1	Wood poles Globe	No. 1 Copper	Suspension 4 Franklin	440	....	Under construction	48,000
Nevada Valleys Power Company	Virginia City to Lahontan Dam, Nev.	36	60	1	Wood poles Chapin	No. 2 Copper	Pin type West.	300	1,100	Completed	82,600
Albuquerque Gas & Electric Company	Albuquerque to Bernalillo, N. M.	17	44	1	Wood poles McFarland	No. 3 Copper, An.	Pin type, West. 2144	275	300	Completed	47,000
The Arizona Power Company	Poland Junct. to Prescott, Ariz.	14	40	1	Steel towers U.S.W.E.& P.	No. 1 str. Copper An.	Suspension 4 Thomas No. 1053	645	1,208	Completed, 1927	12,000
The Arizona Power Company	Yaeger Canyon to Prescott, Ariz.	21.2	40	1	Wood poles Edwards	No. 1 str. Copper An.	Suspension 3 Locke No. 1055	393	744	Completed, 1927	38,000
Salt River Valley Water Users' Association	Stewart Mt. Dam to Granite Reef Dam, Ariz.	13	44	1	Wood poles (proposed)	2/0 Copper	Suspension	....	....	Proposed	58,000
The Trinidad Electric Transmission Railway & Gas Company	Koehler to Dawson, N. M.	15 (Approx.)	44	1	Wood poles	No. 1 str. Copper	Pin type 55-kv.	230	275	Completed, 1927	67,000
Yuma County Water Users' Association	Laguna Dam, Calif., to Yuma, Ariz.	9	33	2	Wood poles	.....	.....	....	....	Proposed	35,000

*ABBREVIATIONS:—**Towers and Poles:** Stoddard, Stoddard Lumber Company; Kaniksu, Kaniksu Cedar Company; Chapin, Chapin Pole Company; McFarland, L. D. McFarland Company, Ltd.; U.S.W.E.& P., United States Wind Engine & Pump Company; P.C.S., Pacific Coast Steel Company; N.N.S., Newport News Shipbuilding & Drydock Company. **Conductors:** An., Anaconda Copper Mining Company; Al. and A.C.S.R., Aluminum Company of America; Am. Br., American Brass Company. **Insulators:** J.D., Jeffrey-Dewitt Insulator Company; Hewlett, Locke Insulator Corporation; O. B., Ohio Brass Company; Locke, Locke Insulator Corporation; Pyrex, Corning Glass Works; West., Westinghouse Electric & Manufacturing Company; Franklin, Franklin Porcelain Company; Thomas, R. Thomas & Sons Company.

(a) Subsidiary of Montana Power Company.

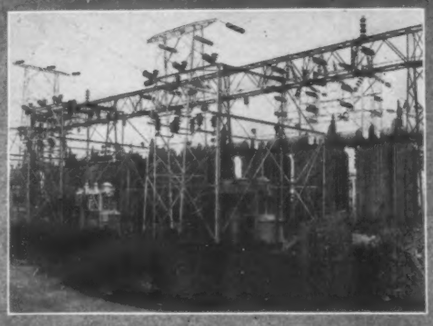






New Substations

(1) El Centro 87-kv. terminal, The Southern Sierras Power Company. (2) 132-kv. transmission terminal of the Idaho Power Company at American Falls. (3) Sunnyside substation of The Washington Water Power Company. (4) Century 220-kv. receiving station of the Los Angeles Bureau of Power & Light. (5) Mesa (Ariz.) 110-kv. terminal of the Salt River Valley Water Users' Association. (6) San Bernardino control station of The So. Sierras Power Company.



Some Additions to Transmission Systems in the Eleven Western States 1927-1928

Company	Location	Length (Miles)	Voltage (Kv.)	No. of Circuits	Supports	Conductor	Insulators	Spans Aver. (Ft.)	Spans Max. (Ft.)	Status	Estimated Cost
The California Oregon Power Company	Prospect, Ore., to Copco No. 2 and Medford, Ore.	74	66 (132)	1	Wood poles	250,000 c.m. Copper An.	Suspension J. D. and West.	600	2,777	Completed, 1927	$750,000
Pacific Gas and Electric Company	Newark to Morgan Hill	35	110	2	Steel towers	250,000 c.m. Copper	Suspension	800	....	Under construction	625,000
Pacific Gas and Electric Company	Hopland to Lakeport	12	60	2	Wood poles	No. 4 Copper	.....	....	....	To be completed in 1928	100,000
Pacific Gas and Electric Company	San Mateo to San Bruno	5.5	110	2	Steel towers	211,000 c.m. Copper	Suspension 9 and 10	800	....	To be completed in 1928	144,800
Pacific Gas and Electric Company	Mountain View Junct. to Mountain View Sub	3	60 (110)	2	Steel towers	4/0 Copper	Suspension 9 and 10	800	....	Completed, 1927	472,000
Pacific Gas and Electric Company	Roseville to Antelope	7.9	60	1	Steel and Wood poles	2/0 str. Copper	Suspension O.B. and pin type miscl.	264	350	Completed, 1927	70,500
Pacific Gas and Electric Company	Suisun to Fairfield	0.4	60	2	Steel poles	2/0 Copper	Pin type	400	....	Completed, 1927	22,000
Pacific Gas and Electric Company	Melones to Copperopolis	7.5	104	1	Steel towers	2/0 Copper	Suspension 7 and 8	800	2,090	Completed, 1927	90,000
Pacific Gas and Electric Company	Redwood Sub to Old Line	3.6	110	2	Steel towers	4/0 str. Copper	Suspension 8 and 9	800	....	Completed, 1927	.....
Pacific Gas and Electric Company	Novato to Olema	15.2	60	1	Wood poles	No. 4 str. Copper	Pin type O.B.	300	1,600	Completed, 1927	120,000
Great Western Power Company	Bucks Creek to Oroville	31.1	220	1	Steel towers P.C.S.	795,000 c.m. A.C.S.R.	Suspension O.B. 14 and 15	638	1,380	Completed, Jan. 1928	803,000
Great Western Power Company	Oroville to Brighton Sub	69	220	2	Steel towers P.C.S.	795,000 c.m. A.C.S.R.	Suspension O.B. 14 and 15	799	1,500	Completed, Jan. 1928	1,103,000
Turlock Irrigation District	Don Pedro to Merced Falls	14	73	1	Steel poles	3/0	.....	600	....	Proposed, 1928	50,000
San Joaquin Light & Power Corporation	Tap from Elk Hill line to Honolulu Oil Co. Sub	1	60	1	Wood poles	No. 4 Copper	Suspension O.B. 25622	330	412	Completed, 1927	6,200
San Joaquin Light & Power Corporation	Sanger to Kings River	11.5	110	1	Steel towers	397,500 c.m. Al.	Suspension O.B. 25622	915	1,241	Completed, 1927	100,225
San Joaquin Light & Power Corporation	Merced to Yosemite Portland Cement Co.	6.2	60	1	Wood poles	3/0 Copper	Suspension J.D. 257	352	382	Completed, 1927	27,655
San Joaquin Light & Power Corporation	Merced to Mendota	25.2	60	1	Wood poles	266,800 c.m. Al.	Suspension J.D. 257 O.B. 25622	330	450	Completed, 1927	124,880
The Southern Sierras Power Company	San Bernardino to Rincon	67	88	1	Wood poles Chapin	2/0 str. Copper, An.	Suspension J.D. A257	480	1,032	Completed, 1927	306,000
The Southern Sierras Power Company	Atolia Sub to Pac. Coast Borax Co.	20.3	33	1	Wood poles Chapin	No. 6 Copper, An.	Pin type O.B. 11622-3	300	350	Completed, 1927	40,000
Southern California Edison Company	Rector to Venida	4	66	1	Wood poles	2/0	10 in. C & P	200	....	Completed, 1927	20,000
Southern California Edison Company	Rector to Visalia	3	66	1	Wood poles	2/0	10 in. C & P	200	....	Completed, 1927	40,000
Southern California Edison Company	Rector to Tulare	7	66	1	Wood poles	2/0	10 in. C & P	200	....	Completed, 1927	45,000
Southern California Edison Company	Goshen to Laurel	9	66	1	Wood poles	2/0	10 in. C & P	200	....	Completed, 1927	45,000
Southern California Edison Company	Lancaster to Del Sur	9	66	1	Wood poles	2/0	10 in. C & P	200	....	Completed, 1927	24,000
Southern California Edison Company	Somis to Colonia	6	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	$35,000
Southern California Edison Company	Del Norte to Colonia	5	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	30,000
Southern California Edison Company	Beverly to Marine	7	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	42,000
Southern California Edison Company	Eagle Rock to Garfield	4	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	15,000
Southern California Edison Company	Lighthipe to Carson	3	66	2	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	35,000
Southern California Edison Company	Lighthipe to Katella	6	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	42,000
Southern California Edison Company	Lighthipe to Katella	8	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	56,000
Southern California Edison Company	Lighthipe to Signal Hills	5	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	35,000
Southern California Edison Company	Lighthipe to Somerset	3	66	2	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	26,000
Southern California Edison Company	Lighthipe to Bandini	3	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	21,000
Southern California Edison Company	Westflor to Culver Junction	5	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	35,000
Southern California Edison Company	Stanton to Ocean View	7	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	42,000
Southern California Edison Company	Fairview to Ocean View	9	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	54,000
Southern California Edison Company	Fairview to Irvine	9	66	1	Wood poles	2/0	10 in. C & P	200	....	Completed, 1927	50,000

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Some Additions to Transmission Systems in the Eleven Western States 1927-1928

Company	Location	Length (Miles)	Voltage (Kv.)	No. of Circuits	Supports	Conductor	Insulators	Spans Aver. (Ft.)	Spans Max. (Ft.)	Status	Estimated Cost
Southern California Edison Company	Colton to San Bernardino	4	66	1	Wood poles	4/0	Pin type	200	....	Completed, 1927	20,000
Southern California Edison Company	Laguna Bell to Liththipe	7	220	2	Steel towers P.C.S.	1,033,500 c.m. A.C.S.R.	Suspension West.	1,330	1,693	Completed, 1927	.....
Southern California Edison Company	Big Creek No. 3 to Los Angeles (Crescenta)	223.5	220	1	Steel towers P.C.S.-N.N.S.	1,033,500 c.m. A.C.S.R.	Suspension West.	1,420	5,191	Completed, Jan., 1928	.....
Southern California Edison Company	Long Beach Steam to Lighthipe	9.5	220	2	Steel towers P.C.S.	650,000 Copper Bronze core, Am.Br.	Suspension West. and Lapp	900	1,320	Under construction	.....
Southern California Edison Company	Big Creek 2A to Big Creek 3	6	220	1	Steel towers P.C.S.	666,600 c.m. A.C.S.R.	Suspension West.	1,070	1,918	Under construction	.....
Southern California Edison Company	Alhambra-Anita Loop to Eaton	4	66	2	Steel	4/0	10 in. C & P	800	....	Proposed, 1928	.....
Southern California Edison Company	Atwood to Fullerton	6	66	1	Wood poles	4/0	10 in. C & P	200	....	Proposed, 1928	.....
Southern California Edison Company	Carson to Torrence 2nd circuit	5	66	1	Wood poles	4/0	10 in. C & P	200	....	Proposed, 1928	.....
Southern California Edison Company	Chino to Decles	17	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	.....
Southern California Edison Company	Chino to Pedley	10	66	1	Wood poles	4/0	10 in. C & P	200	....	Proposed, 1928	.....
Southern California Edison Company	Cudahy to Firestone	2	66	1	Wood poles	4/0	10 in. C & P	175	....	Proposed, 1928	.....
Southern California Edison Company	Decles to Colton	11	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	.....
Southern California Edison Company	Decles to Euclid	11	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	.....
Southern California Edison Company	Eagle Rock to Alhambra 2nd circuit	6	66	1	Wood poles	4/0	10 in. C & P	175	....	Proposed, 1928	.....
Southern California Edison Company	Eagle Rock to Glendale	5	66	1	Wood poles	4/0	10 in. C & P	175	....	Proposed, 1928	.....
Southern California Edison Company	Glendale to Macneil Line	4	66	1	Wood poles	4/0	10 in. C & P	175	....	Proposed, 1928	.....
Southern California Edison Company	Laguna Bell to City Sub. "B" 3rd Circuit	7	66	1	Wood and Steel	4/0	10 in. C & P	175	600	Completed, 1927	.....
Southern California Edison Company	Laguna Bell to Cudahy	3	66	1	Wood poles	4/0	10 in. C & P	175	....	Completed, 1927	.....
Southern California Edison Company	Laguna Bell to Firestone	6	66	1	Wood poles	4/0	10 in. C & P	175	....	Completed, 1927	.....
Southern California Edison Company	La Habra to Atwood	8	66	1	Wood poles	4/0	10 in. C & P	200	....	Proposed, 1928	.....
Southern California Edison Company	Lancaster to Little Rock	16	66	1	Wood poles	2/0	10 in. C & P	200	....	Proposed, 1928	.....
Southern California Edison Company	Lighthipe to Chino	32	66	1	Wood and Steel	4/0	10 in. C & P	200	600	Completed, 1927	.....
Southern California Edison Company	Lighthipe to Chino 2nd circuit	32	66	1	Wood and Steel	4/0	10 in. C & P	200	600	Proposed, 1928	
Southern California Edison Company	Lighthipe to Long Beach Steam Plant	10	66	6	Steel towers	4/0	10 in. C & P	800	....	Completed, 1927	.....
Southern California Edison Company	Lighthipe to Signal Hill 2nd circuit	7	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	.....
Southern California Edison Company	Long Beach Steam Plant to City Sub "C"	2	66	1	Wood poles	4/0	10 in. C & P	175	....	Proposed, 1928	.....
Southern California Edison Company	Long Beach-Torrence Line to Watson	2	66	1	Wood poles	4/0	10 in. C & P	200	....	Proposed, 1928	.....
Southern California Edison Company	Macneil to Beverly Hills 2nd circuit	9	66	1	Wood and Steel	4/0	10 in. C & P	175	600	Proposed, 1928	.....
Southern California Edison Company	Marine to Culver Junct.	5	66	1	Wood poles	4/0	10 in. C & P	175	....	Completed, 1927	.....
Southern California Edison Company	Monolith to Arvin	25	66	1	Wood and Steel	4/0	10 in. C & P	200	1,000	Completed, 1927	.....
Southern California Edison Company	Newmark Lines to Goodrich	1	66	2	Steel poles	4/0	10 in. C & P	200	....	Proposed, 1928	.....
Southern California Edison Company	Saugus to Saticoy	45	66	1	Steel towers	4/0	10 in. C & P	800	....	Proposed, 1928	.....
Southern California Edison Company	Torrence to Columbia Steel	3	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	.....
Southern California Edison Company	Torrence to Inglewood Line	2	66	1	Wood poles	4/0	10 in. C & P	200	....	Completed, 1927	.....
Southern California Edison Company	Wabash to Anita	10	66	1	Wood poles	4/0	10 in. C & P	175	....	Proposed, 1928	.....
Los Angeles Bureau of Power & Light	Receiving Station "A" to Receiving Station "B"	11.2	110 (220)	2	Steel towers P.C.S.	500,000 c.m. Copper An.	8 Suspension O.B.	735	920	Under construction	.....

***ABBREVIATIONS:—Towers and Poles:** Stoddard, Stoddard Lumber Company; Kaniksu, Kaniksu Cedar Company; Chapin, Chapin Pole Company; McFarland, L. D. McFarland Company, Ltd.; U.S.W.E.& P., United States Wind Engine & Pump Company; P.C.S., Pacific Coast Steel Company; N.N.S., Newport News Shipbuilding & Drydock Company. **Conductors:** An., Anaconda Copper Mining Company; Al. and A.C.S.R., Aluminum Company of America; Am. Br., American Brass Company. **Insulators:** J. D., Jeffrey-Dewitt Insulator Company; Hewlett, Locke Insulator Corporation; O. B., Ohio Brass Company; Locke, Locke Insulator Corporation; Pyrex, Corning GlassWorks; West., Westinghouse Electric & Manufacturing Company; Franklin, Franklin Porcelain Company; Thomas, R. Thomas & Sons Company.

Development of California Electric Systems During 1927

By F. E. Bonner

District Engineer, U. S. Forest Service, Representing Federal Power Commission, San Francisco.

ADDITIONS to the generating capacity of the California electric systems during 1927 total 84,750 kva. The spectacular Balch plant on the Kings River, with capacity of 33,000 kva. was completed early in the year, and in June, the Melones power house on the Stanislaus River with 27,000 kva. was placed in service on the Pacific Gas and Electric Company system. During August the new Haiwee plant of 6,000 kva. was completed by the City of Los Angeles. This utilizes the drop below Haiwee reservoir and supplants the temporary power house, which for some years has utilized a part of the head available on this section of the aqueduct. Besides these three new hydro plants there was added a new unit of 18,750 kva. to the San Diego steam station B.

The total installed capacity serving the requirements of the state now aggregates 2,198,144 kva. This is divided between the various utility companies and municipal agencies, as shown by Table I. Although the Pacific Gas and Electric Company increased its facilities materially during the year through acquisition of several of the Byllesby companies, the Southern California Edison Company still has slightly more generating capacity. Each of these utilities now possesses installed capacity in excess of 600,000 kva. The system of the associated San Joaquin and Great Western companies is next in rank, with 336,320 kva. These three largest systems control slightly more than 70 per cent of all the generating capacity of the state.

Although the new installation completed during 1927 was smaller than for several years past, the year has witnessed great activity in hydro-electric construction, and as a result there will be completed during 1928 an unprecedented amount of generating capacity. The year 1925 with added installation of 276,000 kva. is the highest of any past year, but 1928 will surpass that record with the addition of over 400,000 kva.

Major hydro developments which are nearing completion include the Bucks Creek project of the Feather River Power Company and the Big Creek No. 2A plant of the Southern California Edison Company. Both these involve extraordinarily high heads, and with the Balch plant finished this year, will give California three large plants with heads considerably in excess of past practice in the United States. Other important work under way consists of the enlargement of the generating facilities on the Drum system of the Pacific Gas and Electric Company system, and the enlargement of the Don Pedro plant of the Turlock and Modesto Irrigation Districts. Also, in southern Oregon the Prospect No. 2 plant of the California-Oregon Power Company is nearly finished, together with the transmission line which will permit a substantial part of the output to be transported to the California market.

Almost half of the new capacity will consist of the enlargement of existing steam stations.

During the past year some notable works auxiliary to the hydro-electric plants were accomplished. The Mono-Bear siphon, which will convey water across the South Fork of the San Joaquin canyon to the Florence Lake tunnel on the Big Creek project of the Southern California Edison Company, was placed in operation

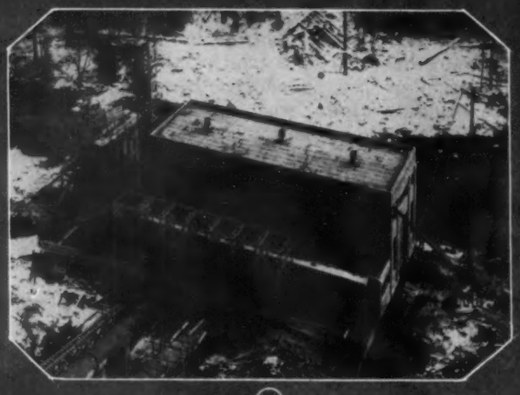
TABLE I—GENERATING CAPACITY OF CALIFORNIA ELECTRIC SYSTEMS
JANUARY 1, 1928

SYSTEM	No. of Plants	Generator Rating Kva. Hydro-Electric	Generator Rating Kva. Fuel Electric	Output Capability Kw. Hydro-Electric	Output Capability Kw. Fuel Electric
Southern California Edison Company	23	348,350	269,900	351,600	256,600
Pacific Gas and Electric Company*	39	461,600	152,000	393,300	145,000
San Joaquin Light & Power Corporation	15	117,600	54,050	112,550	53,500
Great Western Power Company	6	131,670	33,000	138,000	30,000
Los Angeles Gas and Electric Corporation	2		128,450		105,000
City of Los Angeles	10	108,016		94,000	
City of San Francisco	2	83,000		82,300	
The Southern Sierras Power Company	16	69,308	12,018	60,425	8,550
The California Oregon Power Company (a)	11	71,110	350	68,220	200
San Diego Consolidated Gas & Electric Corporation	2		56,000		47,000
Merced Irrigation District	1	31,250		31,000	
Turlock and Modesto Irrigation Districts	3	19,750	1,250	22,300	1,650
City of Pasadena	1		19,327		18,000
Snow Mountain Water & Power Company	1	9,000		6,800	
Truckee River Power Company (b)	5	8,600		8,750	
Coast Counties Gas & Electric Company	3	990	1,250	950	1,000
Utica Mining Company	2	2,150		2,500	
Ontario Power Company (c)	3	1,650		1,575	
Coast Valleys Gas & Electric Company (d)	3		1,375		1,575
Escondido Mutual Water Company	2	600		800	
U. S. Government	2	4,500		2,780	
Total	152	1,469,144	728,970	1,377,850	668,075
Combined Totals		2,198,114 kva.		2,045,925 kw.	

(a) Includes 6 plants in Oregon—12,950 kva.
(b) Includes 4 plants in Nevada— 7,100 kva.
* Includes Western States Gas & Electric Company.
(c) Sub. Southern California Edison Company.
(d) Sub. Pacific Gas and Electric Company.

Hydro-Electric Projects

(1) Pacific Power & Light Company's Lewiston (Idaho) plant, 20-35-ft. head, two 6,250-kva. units. (2) American Falls plant of Idaho Power Company, two 7,500-kva. units added to operate under a head of 48 ft. (3) Prospect No. 2 of the California Oregon Power Company, 590-ft. head, two 20,000-kva. units. (4) The start of the Bridge River job of the British Columbia Electric Railway Co., Ltd. (5) Haiwee, Los Angeles Bureau of Power and Light, 155-ft. head, two 3,500-kva. units. (6) Cedar River where the City of Seattle will add a 14,285-kva. unit during 1928. (7) The Glines Canyon —(Wash.) 13,333-kva. automatic plant of the Northwestern Pwr. & Lt. Co.



in November as a result of two years' strenuous construction effort. On this same project, the Shaver Lake dam was completed and also the tunnel and siphon between Huntington and Shaver Lakes. Work on this great project has therefore progressed closely on schedule to co-ordinate with the completion of the No. 2A power house next June.

The Pacific Gas and Electric Company finished the Pit No. 4 dam, which, for the present will be utilized for afterbay regulation of the Pit No. 3 discharge, and later will divert the water supply for the proposed Pit No. 4 power house. The Bowman project of the Nevada Irrigation District has been finished with the exception of the tunnel from the Middle Yuba. This project diverts water to the Drum system of the Pacific Gas and Electric Company.

The following tabulation summarizes the new installations which are scheduled for completion this year:

Plant	Owner	Completion	Cap. Kva.
Big Creek No. 2A	So. Calif. Edison Co.	June, 1928	90,000
Bucks Creek	Feather R. Pwr. Co.	July, 1928	50,000
Don Pedro	Turlock-Modesto Dis.	Spring, 1928	18,740
Spaulding No. 1 (a)	P. G. and E. Co.	June, 1928	8,000
Spaulding No. 2 (b)	P. G. and E. Co.	June, 1928	3,750
Drum (4th unit)	P. G. and E. Co.	June, 1928	17,500
Station C (steam)	P. G. and E. Co.	June, 1928	37,500
Prospect No. 2 (c)	Calif. Ore. Pr. Co.	Feb., 1928	40,000
San Francisquito No. 1	City of Los Angeles	Nov., 1928	25,000
Long Beach (steam)	So. Calif. Edison Co.	June, 1928	90,000
Seal Beach (steam)	L. A. Gas & E. Co.	Aug., 1928	43,750
Pasadena (steam)	City of Pasadena	May, 1928	20,000
		Total	444,240

(a) Replaces old plant of 3,750 kva.
(b) Replaces old plant of 1,000 kva.
(c) Replaces old plant of 4,700 kva.

According to preliminary figures the total energy production for 1927 amounted to about 7,342,000,000 kw.-hr., which represents an increase of 6.1 per cent over 1926. This is a somewhat lower rate of increase than the 11.4 per cent of last year, and less than the average for a number of years back. Quite likely the decreased rate is partly due to the reduction of agricultural pumping on account of the wet season, but also some slackening of the demand by industiral activities has occurred. For the United States, as a whole, the output increased only about 8 per cent over 1926, or about 4 per cent less than the rate of increase for the two preceding years.

Table II presents the energy production for the past 17 years and shows the respective amounts generated from water power and fuel. The fact that 1927 was a favorable year from the standpoint of water supply is strongly emphasized by the large proportion of energy generated from water power. Slightly more than 90 per cent of the output was from this source. This is a higher percentage than has occurred in any previous year.

TABLE II—ENERGY PRODUCTION, CALIFORNIA ELECTRIC SYSTEMS, 1911-1927

Year	Hydro Kw.-hr.	Per Cent	Fuel Kw.-hr.	Per Cent	Total Kw.-hr.	Per Cent Inc.
1911	1,068,000,000	76.2	334,000,000	23.8	1,402,000,000	
1912	1,143,000,000	71.5	445,000,000	28.5	1,588,000,000	14.0
1913	1,252,999,000	66.4	634,059,000	33.6	1,887,058,000	11.8
1914	1,834,682,000	85.7	305,918,000	14.3	2,140,600,000	13.4
1915	1,884,660,000	83.6	368,437,000	16.4	2,253,097,000	5.3
1916	2,079,365,000	86.4	326,917,000	13.6	2,406,282,000	6.8
1917	2,286,711,000	82.7	479,911,000	17.3	2,766,622,000	15.0
1918	2,342,698,000	77.0	700,344,000	23.0	3,043,042,000	10.0
1919	2,337,698,000	70.9	958,198,000	29.1	3,295,896,000	8.3
1920	2,570,517,000	69.7	1,115,718,000	30.3	3,686,235,000	11.8
1921	3,238,628,000	82.1	706,928,000	17.9	3,945,556,000	7.0
1922	3,748,407,000	87.0	561,277,000	13.0	4,309,684,000	9.2
1923	4,134,965,000	81.7	924,351,000	18.3	5,059,316,000	17.4
1924	3,185,359,000	57.5	2,355,949,000	42.5	5,541,308,000	9.5
1925	5,215,242,000	83.9	996,997,000	16.1	6,212,239,000	12.1
1926	5,705,588,000	82.4	1,214,343,000	17.6	6,919,931,000	11.4
1927	6,644,500,000	90.5	697,500,000	9.5	7,342,000,000	6.1
Total	50,673,019,000	79.4	13,125,847,000	20.6	63,798,866,000	
	Average annual increase 1911-1927 (compounding)					10.9

Note: Figures for 1927 are preliminary.

The steady growth of California systems during the past several years is graphically presented by Fig. 1.

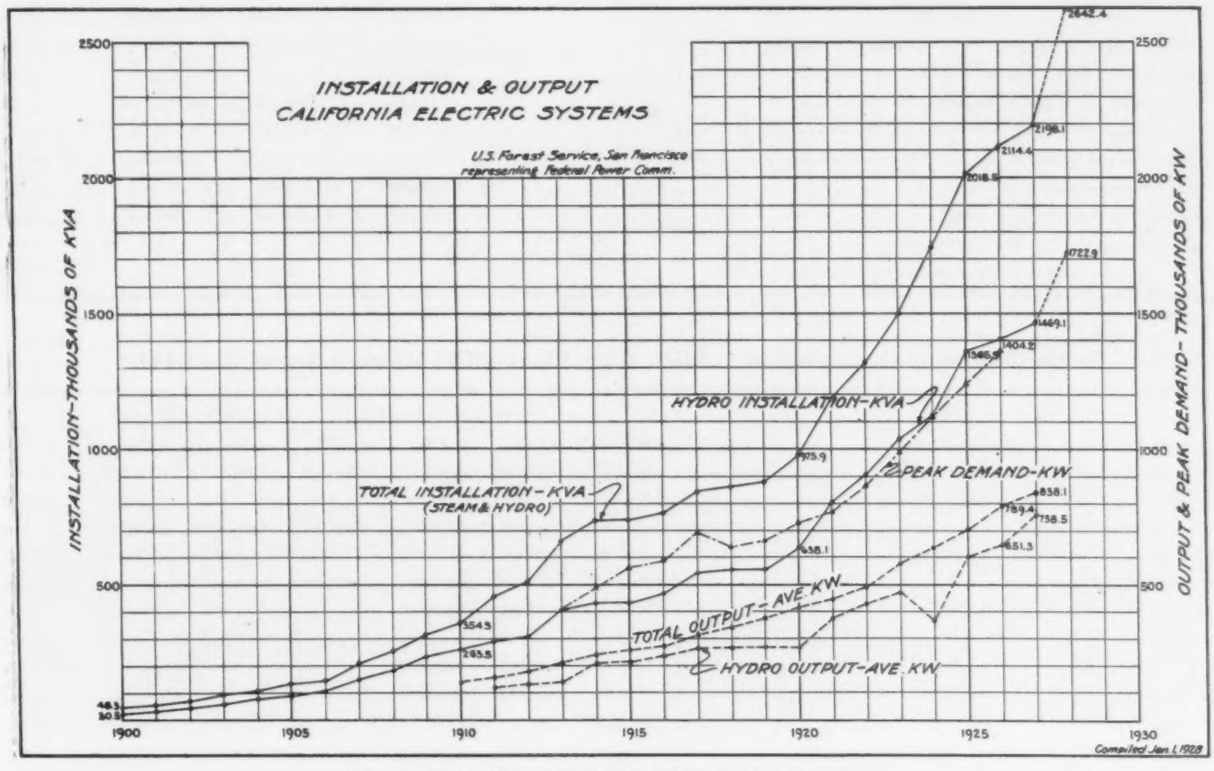
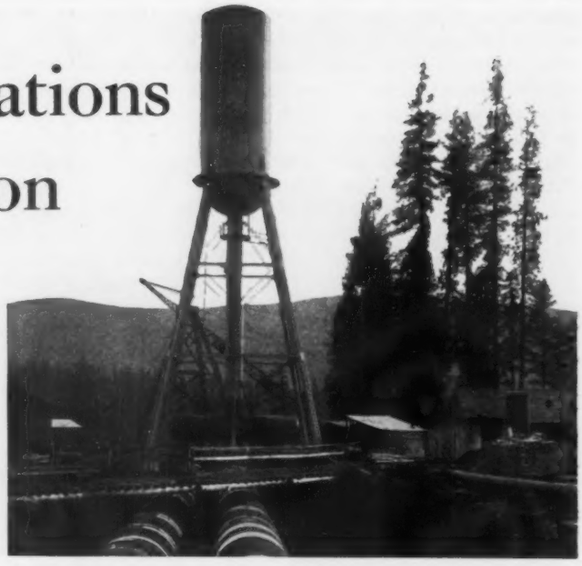


Fig. 1—Installation and output, California electric systems.

Central Station Operations Show Slight Deviation From Normal During 1927



Surge chamber of Prospect No. 2 plant of The California Oregon Power Company

THE year 1927 witnessed a slight deviation from the normal trend of progress of the light and power companies of the eleven Western states. Energy requirements of the 2,875,940 customers resulted in the generation of 13,726,565,000 kw.hr. for which the central stations received a gross revenue of $214,700,000. Energy generation for the year was 7.5 per cent over 1926 while gross revenue showed an increase of 7 per cent. These figures compare with increases of 10.3 per cent for generation and 10.4 per cent for gross revenue for 1926 over 1925, the decrease being accounted for by a marked reduction of irrigation requirements due to the heavier rainfall during 1927.

Of the energy generated 12,269,047,000 kw.-hr. were produced in hydro plants and 1,457,518,000 kw.-hr. in steam plants. This represents an increase of 14.3 per cent in hydro production and a decrease of 28.5 per cent in steam production over 1926. In the operation of the steam plants there was consumed during the year 529,473 short tons of coal, 1,422,337 bbl. of oil and

Table 1—Central Station Operation in 11 Western States in Comparison With United States, 1926 and 1927

Item	11 Western States 1926	11 Western States 1927*	United States 1926	United States 1927*
Energy generated (thousands of kw-hr.)	12,770,094	13,726,565	69,158,114	75,116,078
Energy generated by hydro plants (thousands of kw-hr.)	10,729,807	12,269,047	25,833,603	29,041,778
Energy generated by fuel plants (thousands of kw-hr.)	2,040,287	1,457,518	43,324,511	46,074,300
Coal consumption by central stations (short tons)	634,253	529,473	36,594,540	37,442,120
Fuel oil consumption by central stations (bbl.)	2,611,521	1,422,337	8,970,356	6,409,639
Gas consumption by central stations (thousands of cu. ft.)	10,527,279	8,372,829	52,160,061	65,465,314
Gross revenue from sale of energy	$ 200,900,000	$ 214,700,000	$1,652,300,000	$1,783,700,000
Operating and maintenance expenses†	$ 73,900,000	$ 86,300,000	$ 723,000,000	$ 766,700,000

*Based on ten months' operations.

†Do not include interest, taxes, depreciation or sinking fund.

Table II—Energy Generated in Public Utility Plants of 11 Western States, 1921-1927*

State	ENERGY GENERATED (THOUSANDS OF KW.-HR.) 1921	1922	1923	1924	1925	1926	1927†
California	3,982,938	4,379,703	5,069,314	5,566,440	6,215,813	6,898,620	7,510,000
Oregon	468,534	512,804	594,434	678,394	729,859	831,135	905,000
Washington	1,176,662	1,285,625	1,446,486	1,503,560	1,623,007	1,807,792	1,980,000
Nevada	36,532	39,282	47,048	41,623	39,703	36,840	37,000
Utah	119,551	145,689	272,577	266,946	339,967	349,604	361,000
Arizona	132,434	144,615	157,183	153,196	130,531	172,243	177,000
New Mexico	15,768	17,140	18,268	19,913	21,787	25,993	27,000
Colorado	362,651	413,475	461,570	490,030	522,892	561,962	581,000
Wyoming	37,855	38,985	48,853	53,556	55,544	59,381	61,000
Idaho	550,149	615,783	694,781	792,532	754,079	810,789	836,000
Montana	596,610	984,972	1,138,545	1,145,285	1,262,629	1,407,903	1,454,000

*U. S. G. S. Data.
†November and December estimated.

Table IV--Classification of Central Station Customers Showing Growth During 1927

State	Total Central Station Customers			Domestic Lighting Customers			Commercial Lighting Customers			Industrial Power Customers		
	Jan. 1, 1927	Jan. 1, 1928	Growth 1927	Jan. 1, 1927	Jan. 1, 1928	Growth 1927	Jan. 1, 1927	Jan. 1, 1928	Growth 1927	Jan. 1 1927	Jan. 1, 1928	Growth 1927
California	1,564,800	1,672,100	107,300	1,256,000	1,335,900	79,900	171,000	181,850	10,850	137,800	154,350	16,550
Oregon	197,900	209,400	11,500	170,200	180,600	10,400	18,950	19,650	700	8,750	9,150	400
Washington	366,400	382,700	16,300	316,200	330,080	13,880	41,120	42,790	1,670	9,080	9,830	750
Nevada	16,917	17,600	683	13,157	13,730	573	3,320	3,400	80	440	470	30
Utah	114,700	119,300	4,600	100,800	104,600	3,800	10,800	11,450	650	3,100	3,250	150
Arizona	41,900	43,480	1,580	34,400	35,700	1,300	5,460	5,660	200	2,040	2,120	80
New Mexico	25,700	27,050	1,350	21,400	22,540	1,140	3,250	3,410	160	1,050	1,100	50
Colorado	194,700	204,500	9,800	161,700	169,000	7,300	24,350	26,250	1,900	8,650	9,250	600
Wyoming	33,600	35,240	1,640	28,800	30,200	1,400	3,400	3,570	170	1,400	1,470	70
Idaho	77,300	79,900	2,600	61,360	63,500	2,140	13,590	13,950	360	2,350	2,450	100
Montana	80,880	84,670	3,790	64,200	67,120	2,920	12,900	13,400	500	3,780	4,150	370
11 Western States	2,714,797	2,875,940	161,143	2,228,217	2,352,970	124,753	308,140	325,380	17,240	178,440	197,590	19,150
Total U. S.	20,178,531	21,694,100	1,515,569	16,359,279	17,596,390	1,237,111	2,963,410	3,166,570	203,160	855,842	931,140	75,298

8,372,829,000 cu. ft. of natural gas. This is a drop of 104,780 tons of coal, 1,189,184 bbl. of oil and 2,154,450,000 cu. ft. of gas as compared with 1926.

The gross revenue of $214,700,000 for 1927 compares with $200,900,000 for 1926. Operating and maintenance expenses exclusive of interest, taxes, depreciation and sinking fund requirements were $86,300,000 as compared to $73,900,000. Operating ratio increased from 35.4 to 40.0, the nearest approach yet to the national figure which was 43.0 for 1927.

Customers Served

The total number of customers served reached 2,875,940 on Jan. 1, 1928, showing an increase for the year of 161,143. The domestic market is the largest from a quantitative standpoint with 2,352,970 customers.

Table III--Number of Central Station Operating Systems and Installed Generator Rating, Dec. 31, 1927

State	Operating Companies Total Number	Commercial	Municipal Systems	Generator Rating (Kva.)
California	77	53	24	2,420,000
Oregon	34	27	7	294,000
Washington	66	55	11	636,000
Nevada	15	13	2	11,200
Utah	35	13	22	116,300
Arizona	28	22	6	52,500
New Mexico	23	22	1	7,800
Colorado	64	37	27	170,000
Wyoming	33	20	13	17,200
Idaho	48	29	19	254,000
Montana	37	34	3	431,000
Total 11 Western States	460	325	135	4,410,000

There are 325,380 commercial lighting customers and 197,590 industrial power consumers. Domestic consumers increased 5.5 per cent; commercial lighting customers 5.6 per cent and industrial power consumers 10.7 per cent during the year.

The West continues to hold its position as the most highly developed section of the United States electrically. Data covering the operations of all power companies of the nation show that in the eleven Western states there are 13.2 per cent of the total customers using 18.3 per cent of all energy generated. Forty-two and a half per cent of all of the hydro-electric energy produced in the country came from Western water-power plants during 1927. More than one-fifth of the industrial power customers of the nation are located in the Western states. One of the accompanying tabels showing kilowatt-hours generated per capita substantiates the statement that no section of the country can

TABLE V—PER CAPITA GENERATION IN THE ELEVEN WESTERN STATES, 1926 AND 1927

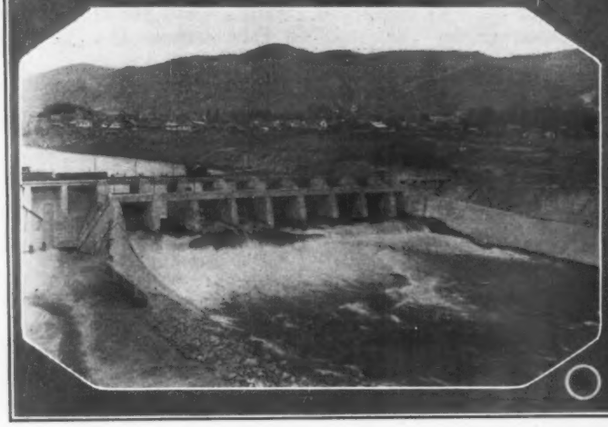
State	Per Capita Generation (kw.-hr.) 1926	1927
Montana	1,920	2,020
California	1,600	1,685
Idaho	1,520	1,560
Washington	1,092	1,267
Oregon	925	1,014
Utah	678	688
Colorado	512	540
Nevada	512	480
Arizona	334	384
Wyoming	237	251
New Mexico	62	69

show the intensified electrical development characteristic of this territory. Whereas five of the Western states show a per capita generation in excess of 1,000 kw.-hr., West Virginia and New York are the only other commonwealths that exceed this figure, the former having 1,260 kw.-hr. and the latter 1,025 kw.-hr.

Black Eagle plant of the Montana Power Company at Great Falls, Mont. One of the features of this plant is the 420 ft. of 90 x 25-ft. canal. The 1,000-acre-ft. reservoir amounts to only a forebay providing an operating head of 50 ft. The three 7,000-kva. units now installed constitute the ultimate.

Storage and Diversion Works for Hydro-Electric Plants

A total new water storage capacity of some 1,595,708 acre-ft. is listed as completed during 1927 and 752,500 more is slated for 1928, all in the eleven Western states and British Columbia. On this page are shown views representative of Western hydro-electric developments. (1) Diversion dam for the Prospect No. 2 project of The California Oregon Power Company on the Rogue River not far from Crater Lake in southern Oregon. (2) The Glines Canyon dam of the Northwestern Power & Light Company on the Elwha River near Port Angeles, Wash. (3) Site of the 385-ft. Diablo dam for the Reflector Bar plant of the City of Seattle, on the Skagit River, Wash. (4) Chelan dam of The Washington Water Power Company on the Chelan River just above its confluence with the Columbia River, about 50 miles above Wenatchee, Wash. This dam provides a depth control of 21 ft. on the 30,476-acre area of Lake Chelan (640,000 acre-ft.) and involved the moving of a part of the town of Chelan Falls. (5) Cutler dam on one of the Bear River projects of the Utah Power & Light Company.



Ideas for the Contractor

A Rational Development of Article 5, N.E.C.

Recommendations of the Northwest Association of Electrical Inspectors for Introducing "What" and "Where" in the Wiring Code

Extracted from a report of L. W. Going, Chief Electrical Inspector, Portland, Ore.; Chairman Code Clearing House Committee, Northwest Association of Electrical Inspectors.

FOR EACH type of wiring and for each material, each kind of fitting, etc., there properly will be a series of situations where its use is approvable and another series of situations where its use is not approvable. In other words, the required nature of wiring materials and their fabrication properly may vary according to location, according to kind of exposure, according to kind of concealment, according to kind of occupancy, according to voltage and current conditions, etc.

Thoughtful representatives of all branches of the electrical industry quite generally have accepted this principle and, to a very limited extent, it has been recognized and observed in past and current rules of the National Electrical Code.

Choice of wiring types, insofar as such choice is determined by rules and regulations, both national and local, is governed by the following basic considerations:

1. Electrical
2. Physical
3. Political.

"Electrical Conditions" which govern the choice of wiring methods include a consideration of the type of electrical system (whether a.c. or d.c., whether single phase or multiphase, etc.), voltage and current conditions, grounding conditions, etc.

"Physical Conditions" include a classification (rather incomplete in the present National Electrical Code) of locations which demand certain kinds of materials or certain methods of fabrication because of exposure to corrosive, moist or conductive conditions, etc., or to mechanical injury, or because of installation in extra-hazardous locations or in occupancies where safety to life is paramount.

"Political Conditions" affecting the choice of wiring types and methods consist of more or less arbitrary and sweeping local laws or ordinances promulgated by local Code administrators. Broadly speaking, special local restrictions of wiring types and methods originate for two reasons: first, the desire for increased safety in the utilization of electricity and, second, the desire for simplification and standardization of wiring methods.

Toward putting into the Code what individual cities have had to write into their own local wiring requirements this effort is directed. Electrical inspectors of the West have championed such a movement for Code improvement for two years. This is their first concrete action as an organized body.

The actual need of sweeping local restrictions as to choice of wiring types may be open to question yet it cannot be denied that even arbitrary regulations of a sweeping character have the advantage of brevity and clarity, an advantage not enjoyed by a more rational (and consequently more complicated) treatment of the subject.

Although no wiring type or method can assure absolute freedom from hazard in the utilization of electric current, yet it is true that certain types and methods do assure more effective protection than others particularly under severe conditions (either mechanical or electrical), and since all electrical installations wherever located may be and frequently are subjected to abnormal electrical conditions and to mechanical disturbance there is a rapidly growing tendency on the part of local inspection authorities to standardize on certain recognized superior wiring types and methods to the exclusion of all others, regardless of occupancy variations, exposure conditions, etc.

Results of "Buck Passing"

Opinion has been divided somewhat as to the right of local code administrators to restrict freedom of choice of nationally recognized wiring types, yet those who have studied the situation closely agree that the National Electrical Code has so far failed to classify, except to a very limited extent, wiring types according to their suitability for use in various occupancies and in various situations.

Needless to say, the subject of "what" and "where" in the treatment of wiring types and materials in the National Electrical Code has been a most delicate one to handle and as a natural consequence it has been most delicately handled. In the vernacular of the street, the "buck" has been passed to local administrators to handle as they see fit and as a result manufacturers of certain kinds of wiring materials have suddenly awakened to the fact that the market for their product is rapidly diminishing and that perhaps after all rational treatment of "what" and "where" in the National Code may in the end conserve their interests far better than abritrary and sweeping local rules.

It is not intended here to criticize the code for its failure to specify "where" various wiring types may or may not be used. It is rather intended to call attention to the fact that the decision as to choice of wiring types has been left to the particular inspection autorities enforcing the code or to the consumer, and that diverse opinions as to what constitutes good practice has resulted in all manner of confusing requirements throughout the country varying from those localities which are wide open to all types of wiring (whether suitable or not) to those territories where all but one wiring type is absolutely prohibited.

A Need for This New Principle

Your chairman appreciates that to specify, limit, restrict, or prohibit the use of the various wiring types according to occupancy variation, exposure conditions, etc., introduces into the National Electrical Code a somewhat new principle. Yet in view of the great diversity of opinion among local code enforcing authorities as to proper wiring practice and in view of the numerous arbitrary and sweeping local regulations which have made their appearance, it would appear advisable at this time for the Northwestern Associa-

* Report rendered at the annual convention of the Northwest Association of Electrical Inspectors, Seattle, Jan. 26-28, 1928.

tion of Electrical Inspectors to make specific recommendations in this matter to the electrical committee of the National Fire Protection Association toward a rational development of Article 5.

Your chairman realizes that early treatment of this subject in the National Electrical Code must be conservative rather than sweeping in character and accordingly presents for your consideration the following classification of wiring types and series of situations where their use is or is not approvable. Article 5 Committee of the N.F.P.A. has given much time and thought to this proposed development of the National Electrical Code and the members of this committee are anxious to learn the ideas and thoughts of inspectors generally in this matter.

Classification of Wiring Types Recognized as Suitable for Low Potential Systems in and About Buildings

Conduit—standard	Knob and tube—concealed
Conduit—thin walled	Non-metallic sheathed cable
Conduit—flexible	Wooden raceway
Armored cable	Bare conductors
Metal raceways	Bare grounded wire system
Metal wireways	Temporary wiring.
Underfloor ducts	
Knob and tube—exposed	

Choice of Wiring Type

Standard Conduit Work may be installed open or concealed in or on any type of building or in any type of occupancy, except as specifically restricted or limited under any article of this code.

Thin Walled Conduit Work may be substituted for standard metal conduit subject to the following restrictions:

1. The maximum voltage between conductors shall not exceed 300 and the maximum voltage to ground from any conductor shall not exceed 150. Thin-walled conduit shall not be used on ungrounded light or power circuits unless such ungrounded circuits are free from exposure to voltages higher than 150.
2. No thin-walled conduit nor its fittings shall contain any conductor larger than No. 8 B&S gage nor any conductor protected by an automatic overload protector greater than 30 amp.
3. Thin-walled conduit shall not be installed in any unfinished attic or roof space nor in any concealed location except where passing directly through floors, walls or partitions as provided for in Section —— and except for underplastered extensions as provided for in Section ——.
4. Thin-walled conduit shall not be installed in any elevator shaft; nor within 5 ft. of floor in rooms used for workshops, storage or goods handling; nor in any occupancy classified in this code as hazardous or extra-hazardous.
5. Thin-walled conduit shall not be installed in any location where exposed to damp, corrosive or other conditions injurious to the raceway or to the conductors or their insulation.

Flexible Conduit Work may be installed open or concealed in or on any type of building or in any occupancy, except as prohibited, restricted or limited under this or any other article of this code. It shall not be installed under the following conditions:

1. Flexible conduit containing any wires without metal sheath, shall not be used where moisture, corrosive, hazardous or extra-hazardous conditions exist nor where subject to severe mechanical disturbance.
2. Flexible conduit shall not be used for service wires.
3. Flexible conduit shall not be used unless its conductivity is reinforced by a bonding wire when and as specified in this article.

Armored Cable Work may be installed:

1. As concealed work, fished or unfished in jointed frame floors and studded frame walls and partitions of single and double dwellings.
2. As concealed fished work in any type of building or occupancy.
3. As exposed work in any type of building or occupancy, where not run unprotected within 5 ft. of floor in rooms used for work shops, storage or goods handling.
4. As plaster concealed circuit extensions and switch loops, from existing outlets on light and appliance circuits, in buildings of fire resistive construction, if run on face of fire resistive covering and concealed under plaster finish, but not extending beyond the limits of the room or suite in which it originates.
5. As flexible conductors to motors or other equipment for which minor movement is necessary, if confined to the necessarily flexible portion of the supplying conductors, and not likely to be subject to disturbance.

Armored Cable Work may not be installed:

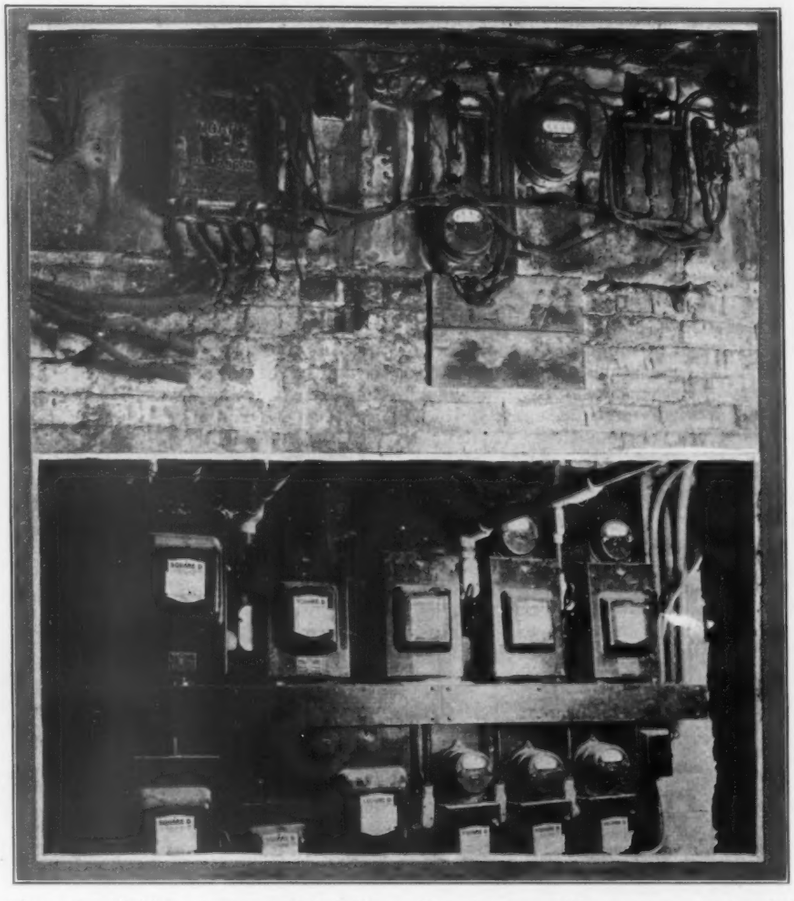
1. For conductors protected by automatic overload protective devices larger than 35 amp., nor for conductor sizes larger than No. 6.
2. For conductors of systems operating at over 150 volts to ground nor of ungrounded systems exposed to higher voltage.
3. For conductor sizes larger than No. 12, except with the current carrying capacity of the armor re-inforced by lead sheath or by an extra conductor under the armor and electrically connected thereto and of size not smaller than two sizes A.W. gage less than the size of the largest contained conductor.
4. For service wires.
5. In high temperature locations.

Metal Raceway Work may be installed in dry locations subject to the following restrictions:

1. The maximum voltage between conductors shall not exceed 300 and the maximum voltage to ground from any conductor shall not exceed 150. Metal raceways shall not be used on ungrounded light or power circuits.
2. No metal raceway or its fittings shall contain more than three No. 10 or No. 12 nor more than four No. 14 wires.
3. Metal raceways shall not be installed in any elevator shaft nor within 5 ft. of floor in rooms used for workshops, storage or goods handling; nor in any portion, except the offices and show rooms of a garage having floor area to permit the storage of more than two machines; nor on the stage or in dressing rooms of theaters and motion picture houses; nor in any occupancy classified in this code as hazardous or extra-hazardous.
4. Metal raceways shall not be installed in any unfinished attic or roof space nor in any concealed location, except when passing directly through floors, walls or partitions as provided for in Section ——, and except for underplaster extensions as provided for in Section —.
5. Metal raceways shall not be installed in any location where exposed to damp, corrosive or other conditions injurious to the raceway or to the conductors or their insulation.

Metal Wireways may be used in the wiring of foot, border, cove, and procenium lights as specified in Section —— of this code, and at meter boards and load centers where the cases of enclosed switches do not provide ample room for enclosing feeders and their connections, or by special permission in

Before and After



The sub-switchboard of an old building in Salt Lake which has recently been remodeled in an up-to-date manner and with new equipment. The upper picture shows the way it looked prior to the change, with a mass of tangled wires and open switches. The lower picture shows the sub-switchboard after changes had been made as requested by the city inspector and power company.

other locations where the use of other wiring types would be impracticable.

Underfloor Raceways may be used only in dry locations, free from corrosive, hazardous or extra-hazardous conditions, in buildings of fire resistive construction and where imbedded in concrete fill or floors which are of sufficient thickness to exceed the height of the raceway at all points. They shall contain no wires to ground exceeding 150, nor any wire of an ungrounded circuit exposed to a higher voltage. They shall contain no ungrounded wire protected by automatic overload protector exceeding 15 amp., nor any circuit other than a final circuit, except as specifically approved for other uses and located and installed as specially provided for in these rules.

Exposed Knob and Tube Wiring (or exposed wiring on insulating supports) may be used except where other types of wiring are required, but shall not be used in the following occupancies, uses and locations:

1. Theaters, churches, schools, hospitals, halls, garages and stores of area exceeding 3,000 sq.ft.
2. Hotels, rooming houses, apartment houses having over two apartments.
3. Factories, workshops, etc., except for wire sizes No. 0 and above not less than 8 ft. above floors, platforms, stairways, etc., and not within reach of persons or objects therein.
4. Hazardous or extra-hazardous locations.
5. Wiring over 300 volts between wires or over 150 volts to ground except over No. 0 size and in locations noted in Item 3.

Concealed Knob and Tube Work may be used in single and double dwellings (and in outbuildings associated therewith) where the following conditions apply:

1. Isolation from other buildings at least 10 ft.
2. In dry locations usually not including unheated basements.
3. In wood joist floors and roof spaces and in wood stud partitions and walls (except where wire lath or metal surface is used).
4. Grounded systems not over 150 volts to ground, or ungrounded systems not over 150 volts between wires and not connected to outside systems exposed to more than 150 volts to ground.

Non-Metallic Sheathed Cable Work may be used in single and double dwellings (and in outbuildings associated therewith) subject to the following limitations and restrictions:

1. The maximum voltage between conductors and from any conductor to ground shall not exceed 150. Non-metallic sheathed cable shall not be used on ungrounded light or power circuits unless such ungrounded circuits are free from exposure to voltages higher than 150.
2. Non-metallic sheathed cable shall be of approved types and may be 1, 2, or 3 conductor assemblies in sizes No. 14 to No. 6, inclusive.
3. Shall be used only in dry places (usually not including unheated basements) and, where exposed, shall in no place run along the wall nearer than 6 in. above the floor. Where within 5 ft. of floor, it shall be protected by wood or metal protecting strip placed over the cable and securely fastened in place.
4. For concealed work, non-metallic sheathed cable shall be installed only in wood joist floors and roof spaces and in wood stud partitions and walls. It shall not be used where wire lath or metal surface is used.

Wooden Raceway Work—Recommend that this type of work be not approved except possibly for minor extensions to existing wooden raceway installations.

Bare Conductor Work as a wiring method is recognized as suitable for use only in shafts or passage ways of fire-resistive construction, used for no other purpose, and with wall thickness not less than 4 in. of brick or concrete except that metal covers may be used for accessibility; provided, however, that for grounded systems, in which no conductor exceeds 150 volts to ground and in rooms or spaces free from storage or handling of combustible material and accessible only to qualified persons, open screen containers may be substituted for the fire resistive walls if of grounded metal or other non-combustible material of adequate strength.

Bare Grounded Wire Systems—Bare wire may be used as one conductor of an interior wiring system, the other wires of which have approved insulated covering where all the following conditions exist:

1. Where the bare wire is permanently and effectively grounded at the point where the system receives its supply.
2. Where the grounding electrode is a continuous underground metallic water or steam piping system which is free from high resistive joints.
3. Where the interior wiring system is directly connected to this electrode at the premises served.
4. Where the bare conductor is at all points contained in standard conduit or its approved fittings.
5. Where no conductor of the system exceeds No. 10 B&S gage, or is protected by an automatic overload protector greater than 15 amp.
6. Where no conductor of the system exceeds 150 volts to ground.
7. Where the system has multiple grounds.
8. It shall be used only for light and appliance branch circuits and only on alternating current systems.

Temporary Wiring other than decorative shall comply with the ordinary rules governing the selection of type of wiring, type of system, and method to be followed, with special attention to protection against mechanical disturbance where construction work is being carried on, and subject to the waiving of any requirement as to wiring type or method at the discretion of the authority having jurisdiction. Temporary installations of approved systems of decorative lighting shall be used only where permission therefor has been granted by the inspection department and where the difference of potential between wires or from any wire to ground does not exceed 150 volts and the system is a grounded one, and where the installation in other respects complies with Section —— of this code.

Stop Denationalization of Code

Your chairman believes that the above outlined treatment on choice of wiring types represents the very minimum which can be endorsed by the membership of the Northwestern Association of Electrical Inspectors for inclusion in the National Electrical Code at this time and that, if we are to anticipate and prevent further denationalization of the code through local departures, the time is now at hand for this and other inspectors' associations to emphasize not only the immediate need of more specific treatment in the National Electrical Code limiting the use of certain wiring types to certain locations and occupancies but also the need for early and **definite action** in this matter by the sponsors of the Code.

Your chairman further believes that the membership of this association, in the interest of public safety, should register its decided disapproval of recent determined efforts on the part of certain groups in the industry to break down wiring standards and that it definitely should establish itself as opposed to any new wiring method (regardless of its cost) which means a lowering of American standards of safety.

New State Rules for Clothes-Cleaning Establishments

An act to reduce fire hazards of clothes-cleaning establishments, providing for the enforcement thereof by the state fire marshal, providing ways and means for enforcement and providing penalties for violations, was passed at the last session of the state Legislature. The "Rules and Regulations of the State of California for Safeguarding Cleaning and Dyeing Establishments" have been issued and became effective Aug. 2, 1927.

The rules relating to electrical installations are as follows:

RULE 32. It shall be unlawful for any person, firm or corporation to use, or to cause or permit to be used, any artificial light of any kind other than electricity in any spotting and sponging establishment or clothes-cleaning establishment; or to use, or to cause or permit to be used, any electric lamp in any hazardous room, unless each such lamp is enclosed in a tight fitting vaporproof globe. . . .

RULE 33. All electric wiring in any hazardous building of any clothes-cleaning establishment shall be enclosed in continuous threaded conduit, and all fittings shall be vaporproof. All switches shall be vaporproof and shall be packed with solid cup grease and be located outside of said building.

RULE 35. All washers, extractors, steam tumblers, stills, filters, clarifiers and dust wheels when same are used for the purpose of drying or deodorizing purposes, or other similar machines, appliances or devices, shall be permanently grounded in a manner approved by the electrical safety orders issued by the Industrial Accident Commission of the State of California.

RULE 36. Every electric motor used in connection with a clothes-cleaning establishment or a spotting and sponging establishment shall be located outside of any hazardous room.

RULE 37. Red pilot lights must be installed and maintained at all times on all electric iron circuits.

RULE 38. Fire and heat resistant stands shall be installed and maintained at all times and all irons kept thereon.

It is understood that a change will be made in Rule 33 which was quoted in Standards Bulletin No. 2. Information is not definite at this time but probably the words "be packed with solid cup grease and" will be eliminated from the rule.

String for Measuring Wire Take-Off—For the contractor who is not equipped with a rotometer or "wheel" a 3-ft. length of stout fishing line may be made to serve very well. If a knot is placed at either end and one knot made of a distinctive nature or colored, it may be used in the following manner: Placing the knot at the beginning of a run of conduit marked on a blueprint and laying the string along the run the estimator will pick up the string at the end of the run. By comparing that much string with a yardstick affixed to the edge of his desk the length of run may be determined quickly.

Red Seal Shows Consistent Gain in

AT THE time of the year when it is customary to look over the record of the past and to set a goal for the new year, it is only natural that the Red Seal plan be subjected to interested inquiry.

Red Seal activity is now being carried on in three sections of the West: Vancouver, B. C., Denver, and in California. The licenses to operate under the Red Seal plan were granted by the Society for Electrical Development in just the reverse order so that the work in California is the oldest and that in Vancouver the youngest. The territory covered in each case also is greatly different not only in extent but in character and extent of building operations.

Vancouver, B. C., according to the last report issued by the S.E.D. covering November, 1927, applications, shows a total of 389 Red Seal applications to date. Out of this must be taken 150 for the 1926 portion leaving an increase of 239 for the 1927 total, a truly excellent showing.

The Denver figures given by the S.E.D. show a total to Nov. 30, 1927, of 106 Red Seal homes, out of which 43 must be taken for the 1926 activity, leaving a total of 63 homes this year, a two-to-one increase over the previous year.

The California figures are best shown by the accompanying table compiled by the California Electrical Bureau, giving a comparison by individual cities of the number of Red Seal homes completed during 1926 and those completed up to Nov. 30, 1927. The total for the eleven months of 1927 up to Nov. 30, was 871; for 1926 there was a total of 720. This indicates an increase of 150 homes over last year with one month yet to be reported upon.

The report which follows, submitted by V. W. Hartley, executive secretary, California Electrical Bureau, tells many other interesting facts, notably that some communities have fallen down considerably upon their last year's work while others have come to the front with substantial increases in Red Seal homes.

The virtue of this type of chart is that it segregates into communities the results of the Red Seal activity and serves to give a clear indication as to where the activity is weakest. No electrical contractor, power company or salesman, finding the Red Seal figure in his community or within the scope of his territory below what it should be, can feel any pride in the year's results thus shown. There is a challenge in every figure given.

While such a summary of the year's work performs a distinct service to the individual electrical contractor or power company man, coming as a post-mortem its field of usefulness is limited. In order to use it as a gage and to set individual quotas in conformity with the results of last year's experience the California Electrical Bureau has devised a new method of handling the situation.

A State of California quota of 1,130 homes is set for the year 1928. This quota will be subdivided or allocated to the districts after conference with the district chairmen. These district quotas will again be subdivided into individual city and town quotas. Each city or town quota will then be subdivided into individual contractor quotas.

In this way John Doe, contractor in Blankville, for example, will be charged with the responsibility of getting two, three or four Red Seal homes during the course of the year, as the case may be. A check on this will be available through the new type of reports to be made out and periodically the status of the Red Seal plan can be checked and a gentle reminder given to the individual who is falling down on his own particular quota.

Thus where a district is weak the responsibility for the failure of the Red Seal plan to operate cannot be shifted from one to another.

It is hoped that this system of follow-up will result in a far better organized movement for the Red Seal during 1928.

First of a string of Red Seal jobs by an investment company in Burbank, Calif., wired by the Kendig Electric Shop. During the public opening 2,000 people visited it. Electric range and refrigerator for the display were furnished by Stolper Electric Shop, also of Burbank.

California Red Seal Homes

Listed by Cities

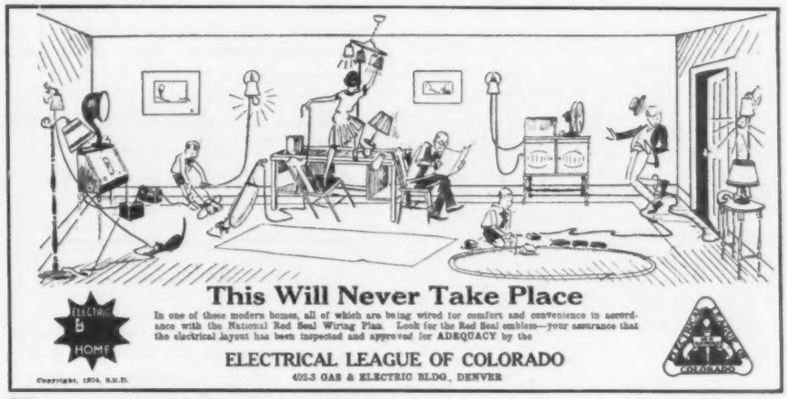
District	Cities over 500,000 population.	1926	1927*
8	San Francisco	70	207
21	Los Angeles	179	128
	200,000-500,000 population.		
9	Oakland	30	39

* Up to Nov. 30.

Fifty Red Seal all-electric apartments—The Chateau des Fleurs, Hollywood—are equipped with Standard 6½-kw. ranges and Frigidaires. Heating is supplied by 201 Wessix flush-type heaters ranging from 1 to 5 kw. E. W. Priest was the electrical contractor.

Three Western Districts Operating Plan

		1926	1927*
	50,000-100,000 population.		
23	San Diego	14	3
6	Sacramento	3	3
9	Berkeley	6	1
22	Long Beach	10	0
	25,000-50,000 population.		
12	Stockton	0	18
16	Fresno	30	13
10	San Jose	9	10
22	Pasadena	1	6
	10,000-20,000 population.		
21	Beverly Hills	0	98
20	Santa Barbara	1	13
7	Vallejo	0	7
25	Riverside	1	4
22	Glendale	11	3
22	Pomona	1	3
22	Santa Ana	0	3
22	Santa Monica	3	1
9	Richmond	12	0
1	Eureka	4	0
18	Bakersfield	4	0
11	Santa Cruz	2	0
25	San Bernardino	1	0
	5,000-10,000 population.		
11	Salinas	5	14
10	San Mateo	0	11
25	Redlands	2	9
3	Chico	4	8
11	Watsonville	10	7
13	Modesto	8	7
4	Marysville	2	6
7	San Rafael	8	4
22	Monrovia	7	3
19	San Luis Obispo	6	3
17	Visalia	2	3
22	Alhambra	1	3
7	Napa	0	3
7	Petaluma	1	2
22	Whittier	9	1
20	Ventura	7	1
7	Santa Rosa	3	1
9	San Leandro	2	1
10	Santa Clara	0	1
25	Ontario	2	0
17	Hanford	2	0
10	Palo Alto	1	0
	2,500-5,000 population.		
17	Porterville	4	8
11	Hollister	0	8
22	Fullerton	1	6
22	Burbank	4	5
15	Madera	3	5
9	Piedmont	0	4
14	Merced	12	3
7	Mill Valley	2	3
9	Pittsburg	0	3
17	Tulare	0	3
9	Martinez	3	2
12	Lodi	1	2
20	Santa Paula	1	2
17	Lindsay	0	2
16	Sanger	0	2
7	Sausalito	0	2
19	Santa Maria	8	1
13	Turlock	5	1
9	Hayward	16	1
10	Redwood City	2	1
11	Gilroy	1	1
3	Red Bluff	1	1
16	Selma	1	1
22	Orange	0	1
4	Oroville	0	1
22	San Gabriel	0	1
21	Van Nuys	0	1
10	Burlingame	5	0
20	Oxnard	5	0
5	Roseville	3	0
2	Dunsmuir	2	0
22	Wilmington	2	0
23	Coronado	1	0
16	Dinuba	1	0
22	Downey	1	0
3	Redding	1	0
22	Redondo	1	0
25	Upland	1	0
	1,000-2,500 population.		
19	Lompoc	0	6
4	Yuba City	0	6
19	Paso Robles	7	5
23	Oceanside	3	5
9	Antioch	0	5
22	Compton	7	4
22	Sierra Madre	0	3
17	Exeter	2	3
13	Tracy	5	2
18	Corcoran	3	2
22	Covina	0	2
2	Yreka	0	2
7	San Anselmo	1	1
23	Escondido	1	1
16	Kingsburg	1	1
13	Oakdale	1	1
20	Ojai	1	1
22	Puente	1	1
25	Chino	0	1
22	Eagle Rock	0	1
22	El Monte	0	1
20	Fillmore	0	1
25	Hemet	0	1
22	Hermosa Beach	0	1
7	St. Helena	0	1
10	Sunnyvale	0	1
19	Atascadero	11	0
22	Claremont	5	0
5	Auburn	3	0
10	Gonzales	3	0
23	La Jolla	3	0
22	Glendora	2	0
9	El Cerrito	2	0
22	Tustin	2	0
3	Willows	2	0
22	Arcadia	1	0
9	Centerville	1	0
16	Fowler	1	0
22	Lancaster	1	0
23	La Mesa	1	0
10	Los Gatos	1	0
5	Lincoln	1	0
10	Mountain View	1	0
	Under 1,000 population.		
18	Wasco	4	13
22	Dominguez	0	7
18	Shafter	2	6
22	Baldwin Park	1	4
23	El Cajon	3	3
22	San Marino	3	3
18	Magunden	0	3
7	Novato	0	3
9	Walnut Creek	0	3
10	Atherton	0	2
7	Cordelia	0	2
17	Lemoncove	0	2
20	Montecito	0	2
23	San Clemente	0	2
19	Solvang	0	2
7	Sonoma	0	2
23	Vista	0	2
22	Alta Canyada	3	1
21	Camarillo	2	1
19	Morro	2	1
22	Altadena	1	1
18	Arvin	1	1
15	Chowchilla	1	1
13	Escalon	1	1
14	Gustine	1	1
7	Penn Grove	1	1
23	Rancho Santa Fe	1	1
15	Ahwahnee	0	1
10	Belmont	0	1
23	Bostonia	0	1
22	Costa Mesa	0	1
9	Danville	0	1
23	Encinitas	0	1
4	Live Oak	0	1
20	Montalvo	0	1
5	Newcastle	0	1
9	Oakley	0	1
22	Orange Cove	0	1
22	Rivera	0	1
7	Rockville	0	1
7	Ross	0	1
20	Serena	0	1
22	Somis	0	1
4	Sutter City	0	1
12	Victor	0	1
16	Woodlake	0	1
11	San Juan	0	1
4	Grimes	0	1
18	Kerman	5	0
23	Mendota	0	1
23	Carlsbad	3	0
19	Arroyo Grande	2	0
11	Castroville	2	0
10	Menlo Park	2	0
2	Montague	2	0
22	Owensmouth	2	0
16	Pinedale	2	0
13	Waterford	2	0
22	Atlantic City	1	0
1	Bayside	1	0
7	Bolinas	1	0
3	Cottonwood	1	0
18	Delano	1	0
23	Del Mar	1	0
13	Denair	1	0
25	Elsinore	1	0
7	Fairfax	1	0
22	Flintridge	1	0
10	Hillsborough	1	0
13	Hughson	1	0
13	Keyes	1	0
7	Larkspur	1	0
9	Lafayette	1	0
10	Los Altos	1	0
20	Moor Park	1	0
11	Morgan Hill	1	0
20	Naples	1	0
16	Orange Cove	1	0
13	Patterson	1	0
19	Pismo	1	0
16	San Joaquin	1	0
20	Santa Susana	1	0
9	Saranap	1	0
21	Strawberry Park	1	0
3	Westwood	1	0
9	Rodeo	1	0
22	Lynwood	1	0
22	Cypress	1	0
		720	871


This Will Never Take Place
In one of these modern homes, all of which are being wired for comfort and convenience in accordance with the National Red Seal Wiring Plan. Look for the Red Seal emblem—your assurance that the electrical layout has been inspected and approved for ADEQUACY by the
ELECTRICAL LEAGUE OF COLORADO
402-3 GAS & ELECTRIC BLDG., DENVER
ELECTRIC HOME
COLORADO
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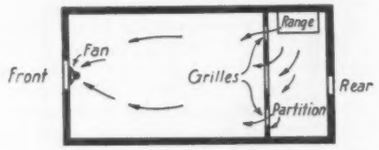
"When we urge people to wire for convenience and comfort the dear public hardly knows what we are driving at," says the Electrical League of Colorado. Therefore it pictures the probable unsightly conditions in a manner which is easily understood by means of a cartoon.

Estimating Ventilation --- Stores and Halls

By J. R. Wilson,* Quality Electric Works, Los Angeles

Electrical Estimating Series—XXXII

IN THE last number of Electrical West the ventilation of hotel and restaurant kitchens was discussed briefly. It was pointed out that if the fan is installed at the rear the fresh air comes in at the front of the restaurant and removes heat and odors before they can circulate elsewhere. Adequate ventilation is also assured for the dining room. If there is a partition between the dining room and kitchen, grilles or registers should be placed on each side of the door, about half way to the ceiling. In lunch rooms, where a large number congregate in a comparatively small space, ventilation is



WRONG WAY
Fig. No. 10 - Plan View

essential and if neglected is sure to reflect in the cash register.

In Fig. 10 is shown the wrong way to ventilate a restaurant. It can be seen readily that in this type of installation all the heat and odors from the kitchen are pulled through the door and grilles into the dining room. The important thing to remember is to place the fan as near to the range as possible and keep all doors and windows next to the fan closed. By proper selection of a fan of adequate size no windows need be open in the kitchen at all. Where the conditions are such that the kitchen

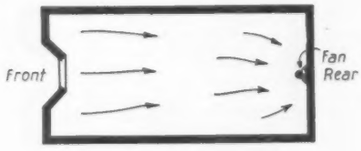


Fig. No. 11 - Plan View

has no free access to the outside atmosphere, recourse must be had to a duct system installed to the roof line.

Stores

Stores vary so much in both arrangement and occupancy that no set rule for location of the fan will meet all conditions encountered. The general rule of placing the fan, or fans, in the rear wall, with fresh air intake at front, will hold good in stores if conditions are such as to make this possible. Owing to arrangement of rear storage rooms, shelving or partitions, it is sometimes impractical to place the ventilating equipment in the rear wall. In that event recourse must be had to duct systems, roof ventilators or "front" ventilation. In stores where no sources of objectionable heat or odors are present, ventilation from the front is sometimes desirable, if a fresh air intake can be provided at the rear. The objection to this method is that the front doors and windows must be kept closed to prevent "short circuiting."

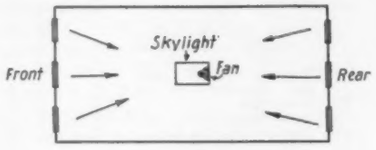


Fig. No. 12 - Plan View

In Fig. 11 is shown the conventional method of ventilating a typical small store by means of one fan, placed in the rear wall of building. This is the simplest method if conditions will permit the installation to be made in this manner. Some one-story store buildings are provided with a skylight placed at a point above the roof line. Where a skylight is available excellent ventilating results can be obtained by placing the fan in this skylight, as shown in Fig. 12 and Fig. 13.

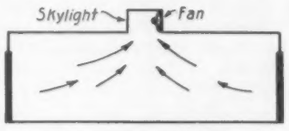


Fig. No. 13 - Side View

Several manufacturers also make special types of power roof ventilators equipped with automatic louvers and designed to be placed in a special penthouse built above the roof, as shown in Fig. 16. Where there is a "false," or attic, space available between ceiling and roof excellent results can be obtained by means of the type of installation shown in Fig. 14 and Fig. 15.

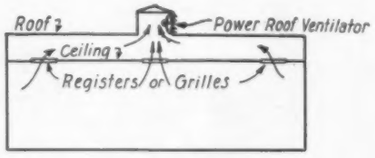


Fig. No. 14 - Side View

Lodge and Dance Halls

Rooms used for the foregoing purposes are usually on the top floor of a building. For this class of installation the most efficient results will be obtained by means of power roof ventilators installed as shown in Fig. 14 and 15. In these sketches the registers are shown placed in the center of the ceiling because of the fact that the usual lodge or dance hall has windows placed on both sides.

Where windows are on one side only the registers should be placed on the opposite side of the room in the ceiling, thus drawing the air across the room from the windows. In some instances better results will be obtained by placing a row of registers on both sides of room in the ceiling. The problem of figuring proper register sizes for any ventilating installation is extremely easy of solution.

Fig. No. 15 - Plan View

How to Figure Register Sizes

The registers must have a total free area equal to that of the fan, or fans, whatever diameter they may be. For example, a 36-in. circle contains 1,018 sq.in., so the register should have at least this area. In a typical installation a 36-in. fan was used and it was desired to use six registers. In this case each register would have one-sixth of the above total, or 170 sq.in. each. But registers and grilles offer about 50 per cent restriction to the passage of air, so it will be necessary to double the 170 sq.in., making 340 sq.in. for each register. Of course the only logical method is to use standard registers, which are made in several sizes. For instance, 340 sq.in. is equal to about 2.4 sq.ft., or 21 x 21 in. which is a standard size. All installation problems involving registers or grilles can readily be solved by the above method.

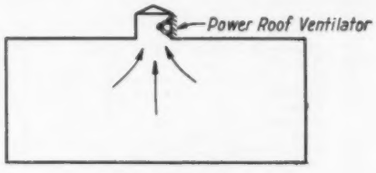


Fig. No. 16 - Side View

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News of the Industry

Washington Water Power Co. Plans Sale of Control

Plans for sale of a controlling interest in The Washington Water Power Company, Spokane, to the American Power & Light Company of New York through a proposed transfer of stock were announced Jan. 18.

Harold T. White, chairman of the finance committee of The Washington Water Power Company, and officers of the American company at New York stated that, subject to necessary corporate action and legal arrangements, it was agreed that all holders of Washington Water Power common stock (par value $100) would be offered two and two-tenths shares of the American company's cumulative preferred stock (paying $6 a share per annum and with no par value) for each share of Washington Water Power common. The offer is conditional upon acceptance by holders of a sufficient number of the 254,418 shares of common stock outstanding. The American Power Company's preferred stock on the day the offer was made stood at $109.25 so that under the terms of the deal holders of Washington Water Power common would receive about $240 for each share that they exchanged.

The Washington Water Power Company was incorporated in 1889 and has grown from a very small property to its present status, with approximately 50,000 accounts in ten counties of eastern Washington and six counties in Idaho. Eight hydro-electric stations are included in its properties, with an installed generating capacity at present of 219,500 hp. New units now in prospect at Chelan will provide 96,600 hp. additional. The company owns or controls the Spokane United Railways and the Spokane Central Heating Company.

D. L. Huntington is president, M. W. Birkett vice-president and general manager, and A. V. Greisser chief engineer.

In an effort to reach as many of its stockholders as possible that they might be informed of the pending deal and thus safeguard their interests, The Washington Water Power Company broadcast the announcement every half hour over the local radio station.

Edison Company Plans 44,000-Hp. Unit for Big Creek 8

Plans for the installation of a 44,000-hp. unit in the Big Creek 8 plant have been announced by the Southern California Edison Company. The unit will be noteworthy in both size and in head, the latter being 715 ft. (static). The installation is to be completed by the middle of 1929.

The new unit will use the water made available by the Mono-Bear diversion and the Huntington-Shaver conduit. This water will be stored in Shaver Lake, used through the new Big Creek 2-A plant and diverted into the present Big Creek 8 tunnel. Ultimately the additional water supply developed by the Shaver storage system will be used in power houses 2-A, 8 and additional units in Big Creek 3.

The proposed installation at Big Creek 8 will consist of a 44,000-hp. vertical reaction turbine and a 35,000-kva. generator. Approximately 2,700 ft. of new penstock ranging between 120 and 80 in. in diameter will be required.

Salt Lake Residential District Installs Street Lighting

Type of ornamental standard installed in Salt Lake City residential district.

Salt Lake City's first ornamental residential street lighting system recently was completed and is now in operation.

This system has been installed in one of the city's finest residential districts, in the northeast section of the city, known as Bonneville on the Hill, and consists of 56 standards of the old English horned or spiked lantern type, of pressed steel, 11 ft. 6 in. high with 250-cp. lamps. The standards are spaced 130 ft. apart on each side of the two streets known as Arlington Drive and Circle Way, covering a distance of about seven blocks. The lights are staggered so that alternating on both sides of the street there is really a standard every 65 ft.

Tacoma Plans to Add Second Unit to Cushman Project

Less than two years after completion of the first unit of the Cushman project, bringing in 50,000 hp. for Tacoma's municipal light and power system, city officials are taking steps to undertake the construction of the second unit. This unit proposes development of 45,000 hp., and Ira S. Davisson, commissioner of light and water, declares it will be needed to avoid a power shortage in the winter of 1930-31, according to present indications. Mr. Davisson has asked the consent of the council to introduce ordinances providing for starting the second unit, but the council asked for more time to study the power needs of the city before being called upon to vote on the question. It is understood the ordinances will propose the creation of a special fund for handling the construction of the second unit and an appropriation of $4,000,000 for the benefit of the fund.

Plans provide for construction of a 13-kv. transmission line from the power house of Unit No. 1 at Cushman to the site of the power house of the second unit, with a connection also to the site of the second dam to be built. This power line will be used during construction to deliver power for the use of contractors and is being put in now so that it will serve the farmers' mutual distribution system on Hood Canal, which has contracted to buy power from the city.

It will take between two and three years to complete the second unit, Mr. Davisson states. J. L. Stannard, chief engineer for the first unit, will continue in that capacity on the second unit.

Company's 1928 Construction Budget Is $5,000,000

In 1928 $5,000,000 will be spent by the Puget Sound Power & Light Company, Seattle, for construction and extensions, according to W. H. McGrath, vice-president.

Included in this sum is an item of $1,267,000 covering cost of a new unit at the Baker River power plant in Skagit County, together with the necessary addition to the power house. An expenditure of $787,000 is provided for a transmission line from the Baker River plant to Beverly Park station; line extensions for new customers will cost $1,652,000; increasing capacity of old substations and building new ones call for a proposed investment of $618,400. At least 10,000 families will be served with electricity who have not had this convenience previously, the company estimates.

California Electric Consumers Promised Rate Reductions

Rate reductions which will affect a large majority of the consumers of electrical energy in California are to be made in the near future by the Pacific Gas and Electric Company and Great Western Power Company, San Francisco, San Joaquin Light & Power Corporation, Fresno, Midland Counties Public Service Corporation, San Luis Obispo, the Bureau of Power and Light and the Los Angeles Gas and Electric Corporation, Los Angeles.

The contemplated reduction by the Pacific Gas and Electric Company and the Great Western Power Company was announced by C. P. Cutten and Chaffee E. Hall, attorneys, respectively, for the two companies at a hearing before the California Railroad Commission in connection with proceedings before that body on the petition of San Francisco and East Bay municipalities, filed some time ago, for a reduction in rates. It was stated that the two companies had been working for many months on the preparation of schedules which would result in very substantial decreases in the rates paid by domestic consumers, that they were not yet in such shape that they might be filed, but that the rate experts were working on them and they would be filed as soon as the work was completed.

The two companies operating in the San Joaquin Valley are affiliated with the Great Western company and will put into effect the rates which are finally adopted, though they are not parties to the rate proceedings. All communities served by the Pacific Gas and Electric and Great Western Companies, in addition to San Francisco and the East Bay cities, will benefit also by the rate reduction.

In Los Angeles the Bureau of Power and Light has been authorized by a resolution passed by the Board of Water and Power Commissioners to reduce its present rates for electricity approximately 10 per cent. The resolution as passed by the board on Jan. 16 instructed the bureau to make a study of rates in all classes of service. E. F. Scattergood, chief electrical engineer of the bureau, stated that this study already has been made and that the reductions are to be put into effect beginning July 1 of this year and will be as follows: light rate, from 5 to 4.5 cents per kw.-hr.; maximum power rate from 4.5 to 4 cents per kw.-hr.

Last July the bureau cut its rate from 5.6 cents to 5 cents per kw.-hr. and reduced its maximum power rate fom 5 cents to 4.5 cents.

Coincident with the announcement of the latest reduction in rates on the part of the municipal department, Addison B. Day, executive vice-president and general manager of the Los Angeles Gas and Electric Corporation, announced that his organization would make a similar move. The Los Angeles Gas and Electric Corporation operates electrical properties within the city limits of Los Angeles. The Southern California Edison Company does not compete with the municipal bureau in the distribution of electricity. It does, however, furnish the bureau at wholesale a very large proportion of the energy which is sold in the city.

Arizona Utilities Association Has Been Reorganized

The Arizona Utilities Association which was formed in 1912, recently has been reorganized. An executive office has been established in the Industrial Congress Building at Phoenix, Ariz. Milton G. Sanders is executive secretary.

Although the association was formed by utilities operating in Arizona for their mutual benefit in bringing them into closer relationship with each other and the Arizona public and for discussion of common problems, it has very good contact with the Pacific Coast Electrical Association through A. F. Morairty of the Arizona association,

W. C. HORNBERGER

who is a director of the Pacific Coast Electrical Association.

Plans are being made for the annual convention which will be held in Prescott, Ariz., April 26-28, as a joint convention of the Arizona Utilities Association, the Pacific Coast Electrical Association and the Pacific Coast Gas Association.

The officers of the association are: president—W. C. Hornberger, assistant

M. G. SANDERS

general manager, Central Arizona Light & Power Company, Phoenix; first vice-president—M. A. Pooler, general manager, Tucson Gas, Electric Light & Power Company, Tucson; second vice-president—L. V. Seares, manager, The Arizona Power Company, Prescott; directors—I. A. Rosok, manager, Arizona Edison Company, Bisbee; W. B. Lewis, manager, People's Arizona Gas & Electric Corporation, Globe.

Los Angeles Engineers' Club Plans New Quarters—Having raised $10,000 by subscription, the Los Angeles Engineers' Club is planning to start immediately to remodel a floor in the Los Angeles City Club Building for use as club quarters. Plans include a lounge, game room and dining room, with kitchen service from the City Club kitchen. Work is expected to be finished by March 1.

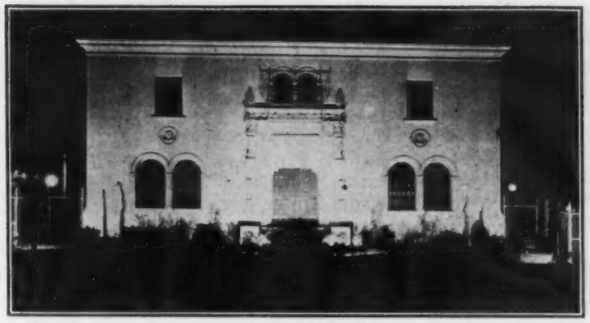
Edison-Herminghaus Controversy Settled Out of Court by Land Purchase

Following nearly four years of litigation and condemnation proceedings, the controversy between the Southern California Edison Company and the Herminghaus estate has been settled out of court by the power company's purchase of the 18,000-acre ranch along the San Joaquin River and the water rights belonging to the estate.

The Herminghaus heirs had claimed that the Edison company in storing the waters of the San Joaquin River had prevented the natural overflow of their lands and thus had usurped their water rights. The California Supreme Court upheld the lower court's decision that the Edison company was infringing upon the riparian rights of the owners of the Herminghaus lands. The case was appealed to the Supreme Court of the United States by the company and that court ruled that it had no jurisdiction in the matter. The Edison company then filed a condemnation suit which was pending when the case was settled out of court. The sum involved in the purchase was not made public, but it is said to have been $1,000,000.

Settlement of this suit marks the clearing of the way for the impounding of water in the Florence Lake reservoir by the Edison company, a proceeding from which the corporation was restrained by an injunction issued at the time the Fresno County court first found for the heirs of the Herminghaus estate.

References to this litigation will be found in the following issues of the Journal of Electricity: Sept. 15, 1924, p. 220; March 1, 1925, p. 185; Nov. 15, 1925, p. 392; Jan. 15, 1926, p. 66; and in Electrical West, January, p. 47; February, pp. 87 and 106; and November, p. 294, all of 1927.



Station F at night.

San Diego Consolidated Gas & Electric Company Completes Two Substations

As part of its expansion program, the San Diego Consolidated Gas & Electric Company has completed a substation at El Cajon, while the Oceanside substation of the same company is in process of extensive alteration.

A 66-kv. line from the company's Station "F" serves the new substation, which includes a 66-kv., a 12-kv. and a 4-kv. section. The 66-kv. section consists of a bank of three 1,000-kva., 66/12-kv. transformers, together with the necessary lightning arresters, switching equipment and control apparatus. One spare transformer is provided. The structure provides for a future transformer bank and a 66-kv. tie line to Escondido, as well as the necessary switching equipment. The service station is of steel frame construction, with brick walls, reinforced concrete floor and roof and stucco finish.

Improvements at the Oceanside substation include the installation of 66-kv. and 12-kv. bus structures. A 4-kv. station will be installed in 1928, according to present plans. The present 66-kv. transmission line up the coast to San Juan Capistrano passes through Oceanside. In the new 66-kv. station, which is entirely of the outdoor type, both the 66-kv. line from San Diego and the 66-kv. line from San Juan Capistrano will be brought into the 66-kv. bus, thus allowing better control of the line in case of trouble. Provision is also made for a future 66-kv. tie line to Escondido. One bank of 66/12-kv. transformers now in use at Oceanside is being supplemented with a new spare transformer and will be installed in the new outdoor structure.

Above—El Cajon substation. Below—Operator's bungalow.

An automatic urban substation also recently completed by this company is Station "F," built of steel and concrete in Spanish design and situated in a residential neighborhood. This station is for switching, transforming and regulating purposes only and is operated by supervisory control from the company's Station "C" several miles distant.

Two Plans for Developing Skagit Considered by Council

Two plans for the further development of the Skagit hydro-electric project are under consideration by the Seattle city council. One proposed by Councilman Oliver T. Erickson, which has the backing of the majority of the council, authorizes a contract with the Ambursen Dam Company for plans for a dam at Hanging Rock and paves the way for what has been known as the Hanging Rock program.

The other plan, backed by the minority group in the council and proposed by Councilman W. T. Campbell, calls for immediate construction of a power house at Diablo Canyon. This latter plan has the backing of both C. W. Morse, city engineer, and J. D. Ross, superintendent of lighting, the latter declaring that the Diablo development can be completed at a cost of $35 a kilowatt, and that the Hanging Rock development will cost $100 a kilowatt. The Diablo plan provides for immediate installation of a third generator of 37,500-kw. capacity, in the present Gorge power house; construction of a complete power plant at Diablo Canyon, where a dam is now in process of construction, this plant to have two complete generating units of 37,500 kw. each; construction of a power tunnel approximately 1,800 ft. long, extending from the Diablo dam to the power house, to be built at Reflector Bar below the Diablo Canyon; building of a transmission line from the Diablo power house to a connection at the Gorge power house with the existing transmission line to Seattle; construction of a second main transmission line from the Skagit plant to the City of Seattle, a distance of 105 miles.

Political Expenditures Must Be Itemized by Utilities

All public utility corporations of the State of California must submit with their annual reports "a statement showing the amount of money expended for political purposes, the accounts to which such expenditures were charged, and the purposes for which such expenditures were incurred or made," according to an order issued by the State Railroad Commission Jan. 4.

The order continues: "By expenditures for political purposes is meant such expenditures, including allocations of compensation of executives, officers and employees for time devoted to political purposes, as are incurred or made to elect or defeat a candidate for public office, or to support or defeat any measure on the ballot, or to place any measure on the ballot, or to keep it from being placed on the ballot at any state, county, municipal or other election during the year. Such statement shall be submitted by the president or general manager of the company under oath, which oath shall show that he knows the facts contained in the statement to be true and correct of his own knowledge. Such affidavit should also show that no expenses for political purposes have been incurred which are not included in the statement."

Complaints from California cities concerning expenditures by public utilities at bond and municipal elections are understood to have been the occasion for the order.

New Building to House Company Division Headquarters

Construction of a three-story building in Auburn, Calif., is expected to be commenced about March 1 by the Pacific Gas and Electric Company. The structure, which will house the executive offices of the company's Drum Division, will occupy a floor area of 34 x 74 ft. Three large windows will be provided for the display of electrical and gas appliances.

The new building which, including real estate and fixtures, will involve an expenditure of more than $50,000, will provide more adequate office facilities for the Drum Division and will centralize all of the division's forces.

Eight Power Houses Planned for Feather River Project

Application has been made by the Pacific Gas and Electric Company, San Francisco, to the Federal Power Commission for a preliminary permit covering a project on the Middle and South Forks of Feather River near Quincy and Oroville, Calif. The application is in conflict with an outstanding preliminary permit held by the Oroville-Wyandotte Irrigation District on the South Fork. There is no conflict on the Middle Fork as the application made by Lars Jorgensen for a license on that stream has been rejected, due to the fact that he could not demonstrate where most of the power would be marketed.

The Pacific Gas and Electric Company plans to construct four storage reservoirs with 252,000 acre-ft. of storage on the Middle Fork. One storage reservoir of 108,000 acre-ft. capacity is proposed for the South Fork. The project includes the erection of five dams. One is to be 370 ft., another 175 ft., another 108 ft., the fourth 50 ft. and the fifth 20 ft. high. There are to be eight power houses, in which it is proposed to install a total of 360,000 hp.

The application covers rights to filings originally made through the Feather Rover Power Company and acquired by the Western States Gas & Electric Company through its holding company, H. M. Byllesby & Company. (Journal of Electricity, Oct. 15, 1925, p. 306.) The acquisition of the Western States company by the Pacific Gas and Electric Company (Electrical West, June, 1927, p. 486) made it necessary to file upon the application again.

Association Issues Warning on Misuse of Edison's Name

Through Preston S. Millar, its secretary, the Association of Edison Illuminating Companies has issued the following statement relative to the misuse of the name "Edison" in electric light and power enterprises:

At the recent annual meeting of the Association of Edison Illuminating Companies held at Colorado Springs, Colo., at which were represented practically all of the electric light and power companies holding original franchise rights from the old parent company, The Edison Electric Light Company, attention was called to a number of cases where new companies or combinations of companies in the public utility field are being organized using the name of "Edison" in their corporate title without proper authority.

An arrangement has been made by the Association of Edison Illuminating companies under which such companies as make use of the name of "Edison" without proper authority are referred to Mr. Thomas A. Edison for such action by him as may seem indicated in each individual case to prohibit the improper and unauthorized use of his name in connection with electric light and power enterprises.

Utah Electrical League Sponsors Series of Lectures

A course of free lectures on subjects covering various phases of the electrical industry has been arranged by the Electrical League of Utah, Salt Lake City, for the benefit of members of the league and their friends. These lectures will be presented by local men who are being chosen to present subjects which will be adapted to their particular branch of activities. The first of this series was given by Dr. H. T. Plumb, of the Salt Lake City branch of the General Electric Company, on the subject of "The A B C's of Electricity." The second lecture was given by Paul P. Ashworth, of the Utah Power & Light Company, who covered the subject of "Power Distribution."

It is planned to have these lectures given once a week, and the following is a tentative list of subjects to be covered: Elementary Electricity, House Wiring, Commercial Wiring, Illumination, Motor Winding, High Tension Transmission, Power Distribution, Electrical Arc Welding, Line Work, Power Transmission, Switches, Electrical Safety, First Aid, Electrical Transportation, Telephone Transmission, Radio, Radio Interference, Carrier Current Communication, Credits, Finance, Auditing, Salesmanship and Merchandising.

Lighting Rates Reduced by Riverside Municipal Light Plant—Upon recommendation of the Board of Public Utilities, the City Council of Riverside, Calif., has approved a reduction in lighting rates of the Riverside Electric Light Plant from eight to seven cents.

Power Bureau Permanently Enjoined From Building Plant on Harbor Lands

Upholding the original temporary injunction issued some months ago restraining the Bureau of Power and Light of Los Angeles from constructing a steam power plant on the harbor lands of the city, the superior court of Los Angeles County on Jan. 9 made this injunction permanent. This is looked upon as a victory for the Southern California Edison Company which had brought suit as a taxpayer in the city asking that this injunction be granted. The company claimed that the plant was not needed, that its construction would be illegal and a waste of public funds, and that its operation would be a violation of the contract made at the time the Edison company's distributing system was taken over by the city. Under the provisions of that contract the city agreed to purchase from the Edison company all electricity needed in addition to that generated by the municipal plants. (Electrical West, February 1, 1927, p. 108, and June 1, 1927, p. 488.)

In June, 1927, the voters of Los Angeles had refused to authorize the Bureau of Power and Light to lease harbor lands to be used as a site for a steam standby plant to cost approximately $4,000,000. (Electrical West, July 1, 1927, p. 47.)

In rendering the decision the court ordered that an item of $1,469,882, which had been transferred from bond moneys to power revenue funds, be returned to the bond fund. This will result in reducing the Power Bureau's appropriation for steam plant and other purposes by the amount named. Press dispatches attribute to E. F. Scattergood, chief electrical engineer of the bureau, the statement that the bureau is planning to build a steam plant on privately owned land.

A Message of Better Lighting

An exhibit displayed at the Utah State Fair by the Electrical League of Utah pictured in the background eyesight conservation, with properly shaded and diffused light while in the foreground the progress of lighting was portrayed by actual models of old methods, from the crude saucer lamp of the year 600 B.C. up to the present standard lamp.

Great Western Company to Build San Francisco Steam Plant

Plans for the erection of a large steam plant in the South Bay section of San Francisco have been revealed by the announcement of the purchase of more than forty acres of waterfront property facing on India Basin and the filing of preliminary papers in legal proceedings for the closing of certain streets. The property faces east on India Basin, about half a mile north of Hunters Point Dry Dock Basin, and covers the land within Jennings and India Sts. and Davidson and Arthur Aves. The site offers the advantage of proximity to a rapidly growing industrial district, water transportation and sufficient ground for all plant buildings and for oil and coal storage.

Work is to be started immediately on the installation of the first unit, which will have a capacity of 35,000 kw. and cost approximately $4,000,000, according to A. Emory Wishon, vice-president and general manager of the company. Design and supervision of the plant are in the hands of McClellan & Junkersfeld, New York engineers.

Employees Sell 10,000 Shares of Stock in 30 Days

The sale in thirty days of an entire new issue of 10,000 shares of preferred stock, mainly to customers, was an accomplishment of the Idaho Power Company, Boise, in the latter part of last year. The stock, which was a $6 dividend cumulative, no par security, offered at $100, brought $1,000,000 into the company's treasury for improvements and additions and other corporate purposes. It was absorbed locally, principally in small blocks sold by employees.

The issue was a new one authorized by the former stockholders and given the same position in the financial structure with respect to rights and privileges as is enjoyed by the older issue of 7 per cent preferred stock, all of which had been sold out long ago. The new stock is callable at $110.

Bell Laboratories' Official Visits San Francisco

Dr. Edward Beech Craft, executive vice-president of the Bell Telephone Laboratories, New York, recently arrived in San Francisco. During his stay there Dr. Craft addressed the Electrical Development League at its meeting on Jan. 23, and the meeting of the San Francisco Section, A.I.E.E. on Jan. 24. He also spoke before executives and supervisory heads of The Pacific Telephone and Telegraph Company and was entertained by the faculties of the University of California and Stanford University, telephone officials and groups interested in the electrical field.

Dr. Craft's career has been devoted to research and developmental activities. In 1902 he joined the Western Electric Company in Chicago, feeling that this organization was doing the kind of work that he wanted and offered exceptional opportunity. As his career progressed he became development engineer for the company and later assistant chief engineer, responsible for all the development work in the engineering department of the company, which then operated what are now known as the Bell Telephone Laboratories. In 1922 he took charge for the Western Electric Company as chief engineer of all of its research as well as its developmental activities, and this position he still holds.

From the executive offices of the Coast Counties Gas & Electric Company in the Russ Building, San Francisco, is directed the operation of its properties in five counties of California. Above—The office of S. Waldo Coleman, president. Below—A corner of the women employees' electrically equipped rest room.

Commission Issues Warning in Rate Basis Discussion

Speaking in Los Angeles recently Leon O. Whitsell, of the California Railroad Commission, made a statement which was in effect a warning to the utility companies of California that if they continue to insist on reproduction cost new or present "going concern" value as a basis for property valuation in rate cases, they will strengthen against themselves the threat of municipal ownership.

The conflict between the two theories concerning property valuation is destined to be settled definitely in the immediate future, in the opinion of Mr. Whitsell. The commission holds to the historical cost basis method while the utilities have stood for a reproduction cost at current prices plus "going concern" prices.

News Briefs

War Memorial to American Engineers—The committee of the American Societies of Civil, Mining and Metallurgical, Mechanical and Electrical Engineers has announced that the clock and the carillon for the tower of the new Louvain Library will be made a memorial to all engineers of the United States who gave their lives in the service of their country or its allies at home or overseas or on the seas in any branch of service in the war from 1914 to 1918. The committee seeks information of all such men so that their names may be suitably recorded in this honor roll. Funds for the library which, with the clock and the carillon, is expected to be ready for dedication in July, 1928, were donated by approximately 1,000,000 Americans in all walks of life.

California Railroad Commission Decisions in Digest Form—Under the title, "Digest of Decisions of the California Railroad Commission," a companion volume to "Public Utility Regulation" has been published covering all reported decisions rendered by the commission prior to March 28, 1927. These decisions have been completely digested, and the digest paragraphs are so classified and indexed that decisions on any specific subject are easily and readily accessible. The price of the book is $10 per copy, and orders should be placed directly with the Recorder Printing and Publishing Company, 693 Stevenson St., San Francisco.

Equipment Ordered for Second Chelan Unit—All of the major equipment for the second unit of The Washington Water Power Company's Chelan power house has been ordered. Final shipment has been made on all turbine equipment. The scroll case has been erected, and the balance of the equipment will be installed next spring prior to the installation of the generator, which is scheduled for shipment on March 1.

Idaho Company Reduces Lighting Rate—The Idaho Power Company has reduced its lighting rate, which formerly was 10 cents per kw.-hr. for the first block, to 9 cents. It is estimated that this reduced lighting rate, in conjunction with the combination service rates now in effect, will result in a saving of over $50,000 annually to residential customers.

Municipal Power Plant Completed by Tombstone, Ariz.—Tombstone, Ariz., has completed a municipal electric light and power plant at a cost of $25,000. Current rates run from 18 cents to 10 cents per kw.-hr.

U. S. Civil Service Examination for Junior Electrical Engineer—The United States Civil Service Commission announces an open competitive examination for junior electrical engineer. Applications must be on file with the Civil Service Commission at Washington, D. C., not later than Feb. 25. The entrance salary is $1,860 a year in the District of Columbia. Full information may be obtained from the United States Civil Service Commission at Washington, D. C., or the secretary of the United States Civil Service board of examiners at the post office or custom house in any city.

Engineering Staff Chosen for Construction of Second Cushman Unit—First appointment in organizing a new staff of engineers for the proposed construction of the second unit of the Cushman power project by the city of Tacoma is the naming of J. V. Gongwer as chief assistant engineer, occupying the position of superintendent of hydraulic design and construction. Mr. Gongwer was structural engineer on the first unit. J. L. Stannard will continue as chief engineer, and Alvin F. Darland as superintendent of electrical design and construction.

Change in Control of Arizona Edison Company—Control of the Arizona Edison Company, which serves Yuma, Douglas and Bisbee, has been acquired by the People's Light & Power Corporation, a W. B. Foshay Company holding, through purchase of all the common stock from the General Power & Light Company, Chicago.

Pacific Coast Electrical Association

Engineering Section Experiences Busy Time in San Francisco Meetings

A markedly heavy attendance at all of the committee meetings and lively discussions featured the sessions of the regular group meetings of the P.C.E.A. Engineering Section held at the Clift Hotel in San Francisco Jan. 11-13, inclusive. For the benefit of those interested in various phases of the Section activities, the following summaries are given covering the work of each of the major committees:

Accident Prevention

By W. E. ROW

Southern California Edison Company, chairman.

Operating under a new plan which is somewhat of an innovation in the Pacific Coast Division the accident prevention committee held its first series of joint meetings with the other committees of the section.

On Wednesday meetings were held with the overhead systems and the hydraulic power committees, Thursday with the electrical apparatus and the meter committees.

At each of the joint meetings papers were presented by members of the accident prevention committee dealing with a subject of especial interest to that particular committee. These called forth much valuable discussion and served to bring the thought of accident prevention directly to the attention of those present.

In the accident prevention committee's own meeting on Friday morning lively discussion was occasioned through the interim report on the compilation of accident statistics and reports. The afternoon session was given over to the presentation and discussion of a paper on disciplinary measures in accident prevention work.

Electrical Apparatus

By R. H. HALPENNY

The Southern Sierras Power Company, chairman.

A discussion of the subjects of transformers and induction regulators indicated a tendency on the part of most operating companies to use self-cooled transformer units in the larger sizes. Lightning arrester practice on the part of Pacific Coast companies is decidedly varied. A very interesting map of a large transmission system prepared from the records of the load dispatcher's office over a period of the past five years showed that no part of the system was immune, strokes having been recorded on all lines.

The accident prevention committee met with the electrical apparatus committee during one morning session to discuss the necessity for giving attention to accident prevention in all phases of electric utility work and particularly in construction and operation. Progress was reported in the study of new developments and new applications of relays and the modification of existing equipment to meet special conditions. Several interesting oil circuit breaker design features were reported, including a new heavy-duty single-tank breaker, and the tendency towards the use of multiple breaks for the higher voltages. Data collected from two series of field tests for the determination of the starting current of motors under different conditions of load, voltage and handling were presented. The subcommittee on load dispatching will have its report in final form for presentation at the next meeting.

Discussion of the problems incident to operating personnel indicated the necessity of intelligent rather than literal interpretation of rules in most cases. Tests made on recently installed CO_2 equipment for fire protection of two large turbo-generators were described and the necessity for training and education of employees in the use of fire fighting equipment was stressed. As a protection against oil fires originating in oil field equipment in outdoor stations some companies reported the use of coarse gravel beds under and around the equipment. The study of operating methods and routine is progressing on a very comprehensive program, which includes power houses, transmission lines, transformers and auxiliaries. motor generators and rotary converters, induction regulators, automatic equipment and control batteries.

Hydraulic Power

By E. A. CRELLIN

Pacific Gas and Electric Company, chairman.

The hydraulic power committee held the most interesting and well attended series of sessions which it has had for many years. The first session was opened with a report and discussion of the meetings of the national committee, held in Chicago, Oct. 3-4, 1927. Then the discussion turned to the subject of automatic hydro plants. Four very interesting papers were presented on this subject dealing with the question from various angles.

A joint meeting with the accident prevention committee opened the first afternoon session featuring a paper presented by the latter committee on "Hazards of Hydraulic Operation." Subsequently there was an illustrated talk on automatic hydro plants and an interesting presentation of data on "The Cyclic Character of Rainfall."

Penstock painting and silt deposits were the subjects of reports and discussion at the second morning session. Extensive discussion also took place on the subject of flumes, the papers read on the subject including "Hydraulics of Flume Design," "Mechanics of Metal Flumes," "Erection of Flumes," and "Maintenance of Flumes." The committee is doing some very valuable work on this subject.

Incident to the report and discussion on pressure tunnels which opened the second afternoon session an interesting and instructive talk was presented by Bozo Stankovich, concrete engineer of the Southern Pacific Company, who dwelt upon concrete construction and the use of diatomaceous earth. A report of the subcommittee on power house cranes also was presented. Both elicited active discussion.

Unable to complete its heavy schedule of work this committee found it necessary to hold an extra session the third morning in order to complete its business. At that meeting a preliminary report was presented on "Crest Gates for Dams." All of the subjects under study this year by the committee are active and important to engineers concerned with power company hydraulic development and it is expected that when they are completed they will furnish valuable data for reference purposes.

Inductive Co-ordination

By J. O. BINNEY

Southern California Edison Company, chairman.

The morning session of the meeting was principally devoted to those phases of inductive co-ordination dealing with current cases of parallelism, interference resulting from transients in supply networks and interference resulting from outage lamps in series street lighting circuits. There are no important current cases of parallelism pending at this time.

The subject of interference from transients is of primary importance, but no definite recommendations regarding mitigative measures could be made at this meeting because any measures which might be applied to the power system would have an effect on the existing power-line protective equipment. More data are to be gathered on this subject.

Mr. Holden of the Los Angeles Bureau of Power and Light presented a paper describing in detail the outage-lamp indicator which has been developed jointly by the bureau and the Southern California Telephone Company for use on series street-light circuits. Mr. Gilkison, who is with the technical staff of the N.E.L.A., gave a short talk on the work being carried on by the joint D. & R. subcommittees.

Radio interference emanating from faulty transformers was discussed by H. N. Kalb of the San Joaquin Light & Power Corporation. His experiences and findings have proved helpful to the manufacturers and steps have been taken by them to correct transformer design.

Discussion of power company communication was confined chiefly to standardization of equipment and a subcommittee will be appointed to draft specifications. It is the opinion of the committee that the equipment developed to meet power company demands will be superior to anything which is now on the market and that a ready market will be found.

At a joint meeting with the overhead systems committee a progress report was presented by the joint subcommittee studying the common neutral question. Engineers from the American Telephone & Telegraph Company and N.E.L.A. headquarters arrived on the Pacific Coast about two months ago and a decision probably will be rendered about June 1.

Meter

By W. N. LINBLAD

Pacific Gas and Electric Company, chairman.

There will be three "short courses" for metermen held during 1928. The first, at the California Institute of Technology at Pasadena, will take place during the week of March 19. The other two courses will be held at the University of California and the University of Arizona.

A number of new developments in the metering art have been made by member companies during the past year. These include micro-adjustment for rotating standards, multi-range current transformers up to 3,000 amp., multi-range potential transformers up to 11,000 volts, 30-degree wattmeter, and a special meter shelter.

Data have been gathered on the effect of various lengths of test interval on the accuracies of watthours. These data are being arranged in the form of a report for early publication. Papers were presented on

"Measurement of Expansion Strains on Bus Supports," "Measurements of Transitory Voltages on Substation Bus Using Surge Recorders," "Oscillograph Measurements of Flashovers on 220-Kv. Line," "Tests on Phase Displacement and Voltage Drop Due to Abnormally Long Leads on Potential Transformer Secondaries."

A paper by W. E. Richmond on "Training Metermen in Safety Methods" was read. The importance of keeping the "Safety First" idea ever before the metermen and the best methods of so doing were discussed.

The meter committee plans to have a very interesting exhibit at the annual convention and a tentative program was submitted and discussed.

Overhead Systems

By H. H. MINOR

San Joaquin Light & Power Corporation, chairman.

A joint meeting with the accident prevention committee featuring "Education of Line Foremen in Accident Prevention Methods" opened the sessions of the overhead systems committee. A progress report on the subject of pole line construction tools and equipment followed. New tools and the arrangement of equipment on trucks were discussed. Distribution transformer loading was taken up next and a tabulation of demands and connected transformer capacities for various connected loads was presented. A paper on "Transformer Sizes for Cooking and Heating" loads was read, outlining the San Joaquin Light & Power Corporation's methods of determining the necessary transformer requirements for such loads, particularly for small installations in suburban or rural territory.

The subject of pole line structures and devices brought out considerable discussion and the final report of this subcommittee undoubtedly will be of great value.

The status of the work being done by the national committee on "Standard Pin and Insulator Threads" was reported upon. This study was inaugurated by the P.C.E.A. and now is included in the national program. A progress report on the subject of corrosion of metals in line construction was presented next, and the discussion was quite lively. The subcommittee on "Joint Pole Practice and Construction Rules" reported and a very fine paper on "Joint Pole Planning" was read. Progress was reported in the study of the "Common Primary and Secondary Grounded Neutral." This study is being made jointly by the overhead systems committee and the inductive coordination committee with the co-operation of N.E.L.A. and A.T.&T. engineers. The work was reported to be progressing as fast as could be wished.

Prime Movers

By F. G. PHILO

Southern California Edison Company, chairman.

Eight major studies are being carried on by the prime movers committee, each under the direction of a subcommittee chairman. Details of construction for high pressure boilers were described; for pressures above 800 lb. the practice is to build seamless wrought steel drums. A description of the new type of baffling and dry pipe used in the B & W boilers of capacities above 125,000 lb. per hour showed a maximum moisture content below 0.1 per cent. Overcoming of superheater difficulties incident to high pressures and temperatures was suggested through the use of ordinary carbon-steel tubing in place of more expensive alloys. Solenoid safety valve operation was discussed.

Boiler and turbine room instruments—Standardization of the size of record charts was suggested for convenience of filing. Study of filing methods also was suggested due to increase in the number of charts and records incident to the greater number of instruments in the modern steam plant.

Burning of liquid and gaseous fuels—Discussions covered the difficulties caused by deposits of sodium sulphate on superheater and boiler tubes, methods of testing gas and oil burners, experiments in the burning of Dubbs residuum, and experiments by oil companies toward reducing the lampblack content of residuum from 20 or 30 per cent to approximately 3 per cent.

Condensing equipment—Particular attention given to extensive study of condenser corrosion; experiments conducted at the Long Beach steam plant show interesting and very beneficial results. Experiments conducted by the Los Angeles Gas and Electric Corporation show the relative effects of air and carbon dioxide gas on condenser corrosion. Mr. Philo described an accurate method of measuring condenser tube deposits by means of a microscope.

Feed water treatment—Study devoted mainly to treatment of boiler water to maintain proper relation between sulphates and carbonates.

Steam plant maintenance and repair—Use of welding in connection with high-pressure steam lines results in greatly reduced maintenance costs. Careful tabulation of maintenance troubles and segregation by departments paves way for reduction in maintenance charges.

Steam plant operating methods and personnel—General discussion brought out the belief that thoughtfulness toward employees' welfare together with a system of giving recognition for good work gave better results than the more or less questionable method of awarding bonuses. Efficiency competition between departments and between different plants stimulates activity and brings good results.

Turbo-generator equipment — Various manufacturers' representatives gave information pertaining to recent developments. Attention was called to the reduction on the windage losses in generators through the use of hydrogen in the cooling system.

Underground Systems

By H. H. BUELL

Pacific Gas and Electric Company, chairman.

The underground systems committee enjoyed one of the best attended and most active meetings in its history. The program covered a number of subjects of general interest to the industry, as follows:

"Electrolysis as It Affects Underground Lead Covered Cables," by Paul Suransky, a comprehensive treatment of a matter which vitally concerns the underground engineer and which too frequently is overlooked.

"Manhole Castings and Covers," by R. R. Cowles, a study of present practice in design and comments on important features.

"High-Voltage Direct Distribution," by George Hagar, describing the 11-kv. underground distribution system of the Great Western Power Company in San Francisco which has been in operation for about eighteen years.

"Bonding and Grounding Underground Systems and Cables," by P. E. Chapman, and "Operation of Single-Conductor Cables," by R. R. Cowles, are closely related and the latter provided a large amount of valuable data in connection with the magnitude and control of sheath currents.

"Ventilation of Transformer Vaults," by R. C. Powell, a discussion of present practice.

"Operation of Substructure Committees," by H. G. Keesling, presenting the experience of Oakland, Calif., in order to assist other communities in handling problems resulting from occupancy of city streets by the various utilities.

"Operation of a Star-Star Underground System," by J. O. Tobey, a description of the Sacramento, Calif., system which has been in operation for more than 30 years.

"Determination of Temperatures of Underground Cables," by G. L. Hall, supplementing the report presented to the 1927 committee.

Purchasing and Stores Section to Meet.—Feb. 16 and 17 have been set as the dates for the next meeting of the Purchasing and Stores Section, P.C.E.A. The sessions will be held in Room 1026, Los Angeles Gas and Electric Building, Los Angeles. C. D. Weiss, section chairman, has urged all members of committees to make their reports at the earliest possible date to the chairmen of their committees so that final reports can be made at the next meeting.

General Executive Committee to Meet—A meeting of the general executive committee, P.C.E.A., will be held Feb. 9 in the office of W. L. Frost, president, Edison Building, Los Angeles, at 2:30 p.m.

Public Relations Executive Committee Meeting Scheduled—Members of the executive committee of the Public Relations Section, P.C.E.A., will meet at luncheon in the Hotel Biltmore, Los Angeles, Feb. 9, at 12:30 p.m.

Engineering Section Group Meetings Scheduled for April—April 4-6 is the time set for the group meetings of the Engineering Section, P.C.E.A. They will be held in the San Joaquin Building, Fresno.

Northwest Electric Light & Power Association

Public Speaking Contest Plans Announced by Public Information Committee

AMONG the activities of the public information committee of the Public Relations Section of the Northwest Electric Light and Power Association this year perhaps the most important is the public speaking contest, open to the employees of member companies. In commenting on the significance of this contest to the companies and to the employees, the committee chairman, S. E. Skelley, Pacific Power & Light Company, Portland, says in his announcement in part, ". . . . the public speaking contest should prove of the greatest practical value to member companies. This conclusion is not based upon any value that might be attached to the final contest to be staged at the convention, but upon this activity as an aid in arousing the interest of employees in the industry and its problems, as well as in the matter of public speaking as advocated by the N.E.L.A. This means ultimately more than simply developing speakers who may be able to appear credibly in public, since the rank and file of employees, whether or not they actually enter the contest, must necessarily acquire a broader knowledge of their company, its properties and its affairs."

An outline of the contest, with the rules and regulations governing it, follows:

Public Speaking Contest

There shall be held at a time to be determined during a session of the Public Relations Section at the 1928 convention of the Northwest Electric Light and Power Association two public speaking contests open to employees of Class "A" members that shall have been selected by elimination contests conducted by such members within their own organizations under plan herein proposed and subject to the following rules and conditions:

Plan

1. **Contests.**
   Two distinct contests for each class of employees hereinafter specified shall be held.
   (a) A preliminary contest within the organization of Class "A" members;

(b) A final contest open to winners of the aforesaid preliminary contests to be held during the 1928 convention of the association.

2. **Contestants.**

For the purposes of these contests all employees, except officers, officials and general office department heads, shall be divided into two classes.

(a) Class One. District managers. ("District managers" defined. The term district manager shall be understood to include any employee having charge of a geographic division of the territory served by his company.

(b) Class Two. All other employees, except officers, officials, and general office department heads.

3. **Subjects.**

Class One.

(a) The subject to be discussed in preliminary Class One contests shall be left to the selection of the local company.

(b) In the final contest all contestants shall speak on the subject, "The Public Utility's Place in the Community."

Class Two.

(a) The subject discussed in all Class Two contests both preliminary and final, shall be "Government in Business."

Note. Subject intended to apply to the broad field of business generally.

4. **Awards.**

(a) The contestant registering the highest score in the final contests in each class shall receive a cash prize of $75 and shall be presented with a handsomely engraved certificate attesting his or her victory.

(b) The contestant registering the second highest score in the final contest in each class shall receive a cash prize of $25.

(c) The committee shall ascertain and acknowledge in its report to the association the extent of participation of employees of various companies in preliminary and final contests.

5. **Judges.**

(a) No person acting as judge in the final contest shall have any connection with any public utility.

(b) All judges in the final contest may be selected locally where final contest is held.

(c) The final contest shall be judged on basis and under rules laid down by this committee.

6. **Rules Governing Contests.**

(a) This committee shall formulate all rules governing the final contests, but only such general rules touching preliminary contests as are believed to have a bearing upon the proper conduct of the final contests.

(b) Member companies may adopt rules deemed necessary covering details of local preliminary contests.

Rules

1. **Preliminary Contest.**

(a) Except as may be restricted by rules of this committee preliminary contests shall be governed by rules adopted by local companies.

2. **Final Contest.**

Contestants.

(a) No person shall compete except full time employees on the payroll of a member company.

(b) No employee shall compete who shall not have won the right to do so as the result of a preliminary contest within the organization with which connected.

Speeches.

(a) Each contestant must prepare his or her own speech.

(b) Speeches shall be not less than two nor more than three minutes in length.

(c) Speeches in typewritten form must be in the hands of the chairman of the public information committee not later than May 1, 1928.

(d) Speeches shall be submitted and judged prior to contest by three judges working independently on thought and composition in accordance with rules to be prepared and on the following points and percentages:

	Per Cent
1. Adherence to subject	50
2. Thought	25
3. Argumentative arrangement	15
4. Originality of treatment	10
	100

(e) Speeches shall be judged at time of delivery by three judges, other than those passing on thought and composition, working independently on the following points and percentages:

	Per Cent
1. Enunciation	50
2. Poise	25
3. Force and audience appeal	25
	100

(f) Order of appearance in contest shall be determined by lot.

(g) Contestants shall be introduced to judges and audience by number only—later by name, company and position.

Commercial Section to Discuss Progress and Problems

Progress reports from committees, free and open discussion of the problems presented will comprise the main part of the program of the meeting of the Commercial Section, Northwest Electric Light and Power Association, to be held in Portland, Feb. 20-21, 1928, according to J. C. Plankinton, chairman. The meeting room will be the auditorium on the third floor of the new Public Service Building, where delegates are urged to gather promptly at 9:30 on the morning of the 20th.

Committee chairmen have been asked to come prepared to present a report of the work done to date, and committeemen and others will be asked to discuss the subjects presented with the idea of bringing out additional material and of developing findings to be incorporated into the final reports for the convention.

Women's Committee Presents Plays—"The Puget Power Players," sponsored by the women's committee, central district, of the Puget Sound Power & Light Company, in Seattle, recently presented the first two of a proposed series of plays. The plays are put on through the co-operation of the Puget Sound Power & Light Company with its employees, and the cast includes employees of the company.

Northwest Commercial Section to Meet—The Commercial Section of the Northwest Electric Light and Power Association will meet in Portland Feb. 20-21.

A. I. E. E.

Winter Convention—A five-day session at the Engineering Societies Building in New York City, Feb. 13-17, will cover many timely and intensely interesting subjects, among which will be included a session on the interconnection of power systems. Transatlantic radio telephone messages will be exchanged with London during one of the sessions, and at another the awarding of the Edison and the John Fritz medals will take place. Inspection trips will include observation of 132-kv. cable, "iron-clad" switchgear, a.c. networks and other interesting installations. Dr. Norinder of Sweden will speak on the use of the cathode oscillograph for the study of surges on lines.

J. B. Fisken Made Chairman of Pacific Coast Convention

John B. Fisken, consulting electrical engineer in charge of safety work for The Washington Water Power Company, Spokane, has been appointed chairman of the Pacific Coast convention of the American Institute of Electrical Engineers which will be held in that city Aug. 28-31 at the Davenport Hotel.

These dates were selected to enable college students to take part in the proceedings and best to meet favorable weather conditions in Spokane.

Members of the convention committee, already appointed by Bancroft Gherardi, president of the institute are D. L. Huntington, M. W. Birkett, J. E. E. Royer, L. R. Gamble, J. S. Covey, E. R. Hannibal, D. F. Henderson, Richard McKay, Bernard Olsen, Joseph Wimmer, W. S. McCrea, Jr., and

JOHN B. FISKEN

James B. Fisken, all of Spokane; H. P. Carlesworthy of New York; D. L. Brundige, Salt Lake City; E. R. Northmore and L. C. Williams, Los Angeles; George E. Quinan and C. R. Wallis, Seattle; J. E. Yates, Portland; and A. C. R. Yuill, Vancouver, B. C.

San Francisco Section held a joint meeting with the Engineering Section of the Pacific Coast Electrical Association at the Clift Hotel Jan. 13 at which Dr. Harold Norinder, engineer of the Royal Board of Waterfalls of Sweden, discussed "The Result of Eight Years of Research in Lightning Phenomena Surges," with accompanying illustrations.

San Francisco Section will hold its regular dinner meeting at the Engineers' Club on Feb. 24. L. F. Blume, transformer engineer, General Electric Company, Pittsfield, Mass., the speaker of the evening, will discuss "Voltage and Power Factor Control of Interconnected Systems."

Books & Bulletins

ELECTRICAL ENGINEERING LABORATORY EXPERIMENTS

By C. W. Ricker, S.B., S.M., M.E.A., and Carlton E. Tucker, S.B., respectively, Professor of Electrical Engineering, North Carolina State College of Agriculture and Engineering, and Assistant Professor of Electrical Engineering, Massachusetts Institute of Technology. Second edition, 1927; 310 pages; 138 illustrations; 6 x 9-in.; cloth bound. Published by McGraw-Hill Book Company, Inc., New York. Price, $2.25.

This is something more than an abbreviated laboratory manual; it is in reality a laboratory textbook. The first edition was published in 1922, comprising notes that had been used in various engineering schools since 1903, but frequently revised. This present edition comprises a revision of each experiment as has been suggested during the four years of use of the first edition. The authors have made certain re-arrangements and additions to facilitate and make more general the use of the book.

The first three chapters are given over, respectively, to a consideration of measuring devices and their applications, the calculation of instrument ranges, and suggestions for the writing of reports. The authors' treatment of this preliminary material is designed to give the student the necessary experience to enable him to do better work by intelligent application of the proper instruments in the proper places.

Fifty-six separate experiments are given by the authors, and a list of "results required" is attached to each experiment that is of such length as to allow flexibility in the assignment of work.

MERCURY ARC RECTIFIERS AND CIRCUITS

By David Chandler Prince, Fellow A.I.E.E., and Francis Brooke Vogdes, both of the Research Laboratory, General Electric Company, Schenectady, N. Y. First edition, 1927; 6 x 9-in.; cloth bound; 233 pages; 13 tables; 155 illustrations. Published by McGraw-Hill Book Company, Inc., New York. Price $3.

This book should serve well as a textbook or a reference book on the subject of mercury arc rectifiers. The authors have treated their study in two distinct parts; the first gives consideration to the rectifiers themselves and the second to the circuits in which they operate. These two divisions of the subject are so arranged that they may be studied separately or simultaneously.

In their treatment of these subjects the authors have made a normal use of mathematics, avoiding both the usual condensation of mathematical work and the over-emphasis of the mathematical side. No attempt has been made to discuss the details of rectifiers as they are constructed by the various manufacturers or to discuss each specific condition under which rectifiers now may be used.

The first part of the book is given over to a discussion of the rectifier equipment itself, including a discussion of the physics of several simple types of rectifiers and ending with an explanation of the mercury arc rectifier itself. The second portion of the book treats the application and operation of mercury arc rectifier equipment.

DOMESTIC ELECTRIC HEATING

By H. G. Solomon, M.I.E.E., consulting electrical engineer. 116 pages; 50 illustrations; 5 x 7 in.; cloth bound. Published 1927 by Crosby Lockwood & Son, 7 Stationers Hall Court, Ludgate Hill, London. Price 3/6 net.

This booklet is designed as an elementary handbook on British practice of electric heating of residences and public buildings and British practice in domestic electric hot water supply and domestic electric cooking.

THE MAGNETO MANUAL

By H. R. Langman, mechanical engineer. 221 pages; 86 illustrations; 5 x 7 in.; cloth bound. Published in 1927 by Crosby Lockwood & Son, 7 Stationers Hall Court, Ludgate Hill, London. Price 7/6 net.

This book has been designed as a practical and general reference book for automobile engineers, mechanics, chauffeurs and others similarly interested in the application of the magneto. The greater part of the subject matter of the book has been used by the author as the basis of lectures given to practical engineers and engineering apprentices.

The book is divided into 12 chapters, each dealing with a different phase of the general subject of magnetos and running the gamut from underlying principles of magnetos to a discussion of electromagnetic induction and including consideration of various types of magnetos and the different parts of various magnetos, with arrangement necessary for constant spark intensity, methods of timing and setting and the making of other magneto adjustments.

STEAM AND GAS TURBINES

By Dr. A. Stodola, professor at the Polytechnikum, Zurich. Authorized translation from the sixth German edition by Dr. Louis C. Loewenstein, consulting engineer, New York. In two volumes; 7 x 10 in.; cloth bound; 1356 pages; 1,565 illustrations and seven folding charts. Published 1927 by McGraw-Hill Book Company, Inc., New York. Price $15.

Translated directly from the latest German edition, this work constitutes a most comprehensive and complete treatment of the theories involved in the design, construction and operation of modern turbines. Inasmuch as Professor Stodola is recognized as one of the world's leading authorities on steam turbines, this English edition makes generally available fully authoritative information on the subject.

To preserve a proper and useful balance throughout the books a complete and clearly presented study is given of all of the important features of both gas and steam turbines. Attention is given primarily to the theoretical considerations but these are amplified by the presentation of experimental data and are made more readily understandable by consideration of turbine construction and operation.

As a record of progress in development to date and as a foundation for further developments that undoubtedly will be made in the future, this book is important. It should serve with outstanding success as a text and reference for engineers and students interested primarily in the scientific phases of turbine problems but at the same time also should serve as a most valuable reference for the superintendent of a steam station, the responsible operators in charge of steam or gas power equipment, and others directly interested in the subject.

PRINCIPLES OF RADIO COMMUNICATION

By John H. Morecroft, professor of electrical engineering, Columbia University, and past president, Institute of Radio Engineers; assisted by A. Pinto, electrical engineer, Otis Elevator Company; and W. A. Curry, assistant professor of electrical engineering, Columbia University. 1,001 pages; 6 x 9 in.; cloth bound; 831 illustrations; completely revised; second edition, 1927; published by John Wiley & Sons, Inc., 440 Fourth Ave., New York City. Price $7.50.

Undoubtedly this is the most comprehensive radio text that has been published to date. The title of the book is truly descriptive of its subject matter, the author having devoted himself to an exposition of the fundamental and operating principles of radio equipment and circuits. The text is handled in a very clear and concise manner and written in understandable language. Free use of mathematics is made where mathematics is the best descriptive tool at hand but the text is in no wise a mathematical discourse.

The book is by no means a treatise on radio practice; nevertheless, radio circuits and radio apparatus are discussed quite fully where such a discussion assists in the exposition of the underlying principles. The book should be of valuable service to the radio student and the radio dealer who is interested in the technical or semi-technical side of radio equipment and should be of service generally to those interested in having at hand a ready reference of radio facts.

The History of the Incandescent Lamp.—A 208-page illustrated book, prepared by John W. Howell and Henry Schroeder, has been published recently by The Maqua Company of Schenectady, N. Y. This is an interesting exposition of the development of the electric lamp.

Cost Estimation of Irrigation Works.—Bulletin No. 39, University of Washington, Engineering Experiment Station. Prepared by R. B. Van Horn, instructor in general engineering; 61 pages profusely illustrated. Published by University of Washington, Seattle. Price 50 cents.

Meetings

McGraw Medal for Co-operation Awarded W. W. Freeman

Before a distinguished gathering of 300 electrical men W. W. Freeman, chairman Union Gas and Electric Company, Cincinnati, vice-president, Columbia Gas & Electric Company, New York, and president of the Society for Electrical Development for eight years, was presented with the James H. McGraw Medal for Co-operation at a testimonial dinner in his honor given on Jan. 10 at the Hotel Roosevelt, New York, and sponsored by directors of the Society for Electrical Development.

James H. McGraw, president of McGraw-Hill Publishing Company, Inc., presented the purse and medal with a citation which set forth the work Mr. Freeman had done in bringing about a reorganization of the society's directorate and stated in part that "by the appointment of the president and managing directors and other representatives of the four major national associations of the electrical industry and the league council, he achieved a broad official co-ordination of all electrical interests so that the directorate of the society now becomes practically a council of the industry." It was "in recognition of this distinguished contribution to the advancement of the spirit and practice of co-operation among electrical men" that the award was made to Mr. Freeman.

Electrical League of Colorado Chooses 1928 Personnel

Elections in the Electrical League of Colorado, Denver, have resulted in the selection of the following personnel: chairman of the advisory board—B. J. Rowan, executive assistant to the late Robert Miller of the General Electric Company; secretary—E. C. Headrick, of the Headrick Electric Company; treasurer—Dean D. Clark of the Mountain State Telephone and Telegraph Company (both re-elected); jobbers' representatives—B. C. Watts, chairman, J. J. Cooper, A. C. Cornell, C. G. Knapp and C. Richard; manufacturers—F. H. Herzberger, A. E. Bacon, H. Bird, K. L. Francis and F. E. Staible; contractor-dealers—D. D. Sturgeon, W. A. J. Guscott, E. C. Headrick, W. R. Kaffer and L. A. Vosmer; utilities—R. G. Gentry, F. F. McCammon, Clarence Keeler, G. B. Buck and O. L. Mackell. D. D. Clark and C. S. Newell will represent the telephone company.

The chairman of each division automatically becomes a vice-chairman of the advisory board.

New Mexico Convention Date Set—The annual convention of the New Mexico Utilities Association will be held in Albuquerque Feb. 20-22, 1928.

Electrical League Welcomes Radio Audition Winner

San Francisco's welcome home to Miss Emilia DaPrato, winner of second place in the National Radio Audition, was tendered through the San Francisco Electrical Development League at its meeting Jan. 9. Special arrangements were made for this luncheon and the entire seating capacity of the Gold Ballroom was used.

The welcome for the industry was voiced by Don E. Gilman, manager National Broadcasting Company, and the presentation of the $2,000 cash prize was made by R. B. Hale, founder of KPO and president of the California Development League. The musical part of the program included selections by Kane's Hawaiians of KPO and numbers by the National Boadcasting Company's concert orchestra under the direction of Max Dolin. Miss DaPrato sang "Rimpianto," the selection she sang in the Western District Audition, and the aria from "Ernani" which she sang in the national audition from New York.

A. H. Nicoll, Graybar Electric Company, president of the league, presided at the meeting, and Ernest Ingold of Ernest Ingold, Inc., was chairman of the day.

Coming Events

American Institute of Electrical Engineers—Pacific Coast convention at Davenport Hotel, Spokane, Aug. 28-31, 1928.

Arizona Utilities Association—Joint convention with Pacific Coast Electrical Association and Pacific Coast Gas Association in Prescott, Ariz., April 26-28, 1928.

California Electragists—Meeting of Northern Division at Sacramento, March 9-10, 1928.

Meeting of State Motor Section at Fresno, Feb. 10-11, 1928.

California Electrical Inspectors—Annual convention at Santa Barbara, March 22-24, 1928.

Electrical Supply Jobbers Association—Pacific Division—Annual meeting at Hotel Del Monte, Del Monte, Calif., Feb. 2-4, 1928.

National Electric Light Association—Rocky Mountain Division—Meeting in Albuquerque, N. M., Feb. 14-16, 1928.

New Mexico Utilities Association—Annual convention in Albuquerque, N. M., Feb. 20-22, 1928.

Northwest Electric Light and Power Association—Engineering Section—General meeting in Spokane, March 8-9, 1928.

Commercial Section—Meeting in Portland Feb. 20-21, 1928.

Annual convention in Portland, June 19-22, 1928.

Pacific Coast Electrical Association.—General executive committee—Meeting in office of W. L. Frost, Edison Building, Los Angeles, 2:30 p.m., Feb. 9, 1928.

Public Relations Section—Meeting of executive committee at luncheon, 12:30 p.m., Hotel Biltmore, Los Angeles, Feb. 9, 1928.

Meeting Purchasing and Stores Section—Los Angeles, in Los Angeles Gas and Electric Building, Feb. 16-17, 1928.

Engineering Section—Group meetings in San Joaquin Building, Fresno, April 4-6, 1928.

Annual convention, Huntington Hotel, Pasadena, June 12-15, 1928.

Parties for Children Feature Industry's Christmas

"Christmas for the children" was the idea that governed many of the parties of the electrical industry during the holidays.

Among the most enjoyable of these affairs was the sixth annual Christmas party of the Copco Forum, the employees' organization of The California Oregon Power Company, given in Medford, Ore., at which the children of company employees were hosts to about 130 children from Medford and vicinity.

The entire party was given under one roof, in a large amusement hall centrally located. Ventriloquist and magic acts, interspersed by radio announcements from Santa Claus as he made his journey from the North Pole filled the first part of the program. Finally Santa was heard to arrive via airplane, and then the stage and curtains were cleared away revealing a large, beautifully decorated Christmas tree, banked at its base with many presents and surrounded at either side by graduated smaller trees. Santa Claus then distributed the gifts to the children, who previously had indicated to the committees their first, second and third choice for a present.

Finances for the party were raised entirely by voluntary donations from employees, making it strictly an employees' organization party.

The Puget Sound Power & Light Company of Seattle entertained 1,000 employees at a Christmas party. A special assembly for employees' children of two years and under was a feature of the party. Presents for everyone, dancing and a giant Christmas tree, with Norwood W. Brockett and Mrs. Brockett as Mr. and Mrs. Santa Claus, made the occasion a most pleasant one.

About 600 children attended the annual Christmas tree party given by the El Paso Electric Company, El Paso, Texas, in the National Guard Armory. Each boy and girl came with an invitation from Santa Claus himself, and these cards entitled each child to receive a gift. The gifts were arranged in different booths, according to age, and each booth was in charge of two workers who had a list of the children entitled to receive presents there. The gifts were conveniently arranged in the different booths so that they could be handed out as each child presented an invitation.

During the distribution of presents and candy Santa Claus moved about among the children, talking and joking with them and adding to the merriment of the occasion. Singing of Christmas Carols, the performance of feats of magic by D. C. MacIver, president of the Sharp-Elliott Manufacturing Company, and the serving of coffee and doughnuts added to the enjoyment of the evening. The hall was tastefully decorated, and blue and gold lights about the room and on the tree, floodlighting and other lighting effects were used to good advantage. Dancing for the grown-ups followed the party for the children.

Contractors, Dealers and Inspectors

Formation of International Body Prominent Issue of Inspectors' Convention

A DETERMINATION to continue to strive for the formation of an international association and to continue to co-operate with the electrical committee of the National Fire Protection Association through its field secretary as a means of exerting coordinated effort necessary to an adequate revision of the National Electric Code was the keynote of the third annual convention of the Northwest Association of Electrical Inspectors which opened Jan. 26 at Seattle. Seventy-five members registered the first day at the Olympic Hotel, headquarters of the convention, which was sponsored by the Seattle Electric Club.

The efforts to affiliate the sectional inspectors' association in a nation-wide organization were recounted in a progress report by F. D. Weber, secretary of the Northwest association and representing it in the national conference. In the president's annual message H. S. Jenkins, chief electrical inspector, Bellingham, stressed the necessity of securing safety through intelligent code-making and administration without raising the standards to a point where the cost would act as a deterrent to the installation of adequate wiring.

Speakers at the first day's sessions were C. R. Welborn, superintendent label service, Underwriters Laboratories, Chicago, who told how the label service benefited the manufacturers as well as the public and showed pictures of testing laboratories in operation; W. A. Groce, assistant fire marshal of Washington, Olympia, who directed attention to the ideal of service that should dominate the work of public officials; and William Meacham, of Meacham & Babcock, Seattle contractors, who stated that local regulations should be in addition to and not in modification of the national code, and that electrical inspectors should prevent all other members of the electrical fraternity from degrading the industry.

Mayor Bertha K. Landes in welcoming the convention to Seattle assigned the electrical inspectors an important place in the building of communities. The welcome of the Electric Club was brought by its president, R. M. Boykin, manager, central district, Puget Sound Power & Light Company, Seattle, who outlined the three-cornered relationship between the contractor, the inspector and the public, suggesting that the term surveyor instead of inspector would give greater dignity and prestige to the inspector's profession. Responding for the association, J. B. Fisken, consulting electrical engineer, The Washington Water Power Company, Spokane, decried the fact that no code existed in Washington outside the cities so that embarrassment frequently was imposed on central stations faced with applications to connect hazardous installations.

At a luncheon tendered by the Electric Club Harry B. Kirkland, of the Society for Electrical Development, New York, outlined the reorganization of the society and showed its relationship to local leagues and clubs.

Motor Section Meeting Advanced

The State Motor Section of the California Electragists will hold its first meeting at Hotel Fresno, Fresno, Calif., Feb. 10-11 instead of April 13-14 as previously announced.

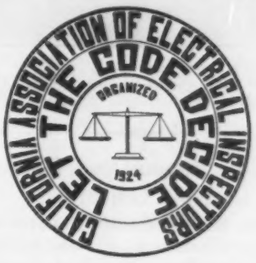
At this meeting electrical motor specialists, dealers, manufacturers' representatives and jobbers will come together to discuss questions of motor distribution policy. A questionnaire covering a number of phases of the motor distribution situation and filled in by motor dealers throughout the state will form the basis for the discussion at the meeting. Two days of pertinent discussion dealing with all phases of motor marketing are promised and an invitation is extended to anyone interested to attend and take part in the discussion.

Pioneer of Santa Cruz

Walter Cox, veteran electrical contractor of Santa Cruz, Calif.

California Inspectors Make Convention Arrangements

Although details of the program for the convention of the California Association of Electrical Inspectors at Santa Barbara, March 22-24, have not been announced by Harry Beecher, president of the association, H. V. Dobson, city electrician of Santa Barbara announces that arrangements are complete for hotel accommodations and a place for the meeting. Special rates have been obtained from the Hotel Carrillo, which will be the convention headquarters.



Emblem of Inspectors' Association devised by C. W. Mitchell.

Meetings will be held in the Chamber of Commerce auditorium within half a block of the hotel.

Such subjects as the proposed additions to the National Electrical Code and affiliation with the newly formed International Association of Electrical Inspectors will form the major topics of discussion. More complete details of the convention program are promised for the next issue of Electrical West and will be published in these columns.

Northern Division Estimators Elect Officers

The San Francisco Estimators' Section, affiliated with the Northern Division, California Electragists, recently elected officers for the new year. **Tom Bennett,** American Electrical Engineering Company, was named president to succeed **N. M. Hope,** California Electric Construction Company; **Fred Greisberg,** Decker Electrical Company, was elected vice-president; **V. R. Kuehn,** Buzzell Electric Company, and **W. W. Kreuter,** Smith Electric Company, were re-elected as treasurer and secretary, respectively.

To the executive committee were elected **H. B. Snead,** Central Electric Company; **M. E. Kipp,** Atlas Electric Company; **M. G. DeLong,** Turner Company, and **E. Minzenmeyer,** Atlas Electric Company, with Tom Bennett ex-officio member.

Other committees named were: **Membership**—E. Minzenmeyer and E. J. Douglas, Enterprise Electric Works. **Constitution and By-Laws**—M. E. Kipp and H. Carriere, H. C. Reid Company. **Program**—N. M. Hope, R. Wessels, Newbery-Pierce Electric Company, and Harold Gerber, Department of Electricity. **Data**—H. B. Snead, M. G. DeLong, W. A. Cyr, Electrical West, and Earl Browne, manager, Electrical Contractors and Dealers Association, San Francisco.

San Diego Knights

Mrs. V. R. Knight, Jack and V. R. or "Pinkey" Knight himself, of California Electric Works, San Diego, Calif.

S. F. Association Elects New Officers

George Smith, Smith Electric Company, San Francisco, was elected president of the San Francisco Electrical Contractors and Dealers Association at its annual meeting recently. Mr. Smith succeeds **Charles Shipman,** Atlas Electric Company, who has served for the last two years.

Other officers elected were: **Lloyd Flatland,** Globe Electric Company, vice-president; **Victor Lemoge** and **Edward Martin,** Sterling Electric Company, named to executive committee membership.

Earl E. Browne was reappointed manager of the association by the executive committee.

A token of appreciation for his two years' active leadership of the association was tendered to Charles Shipman by the members of the association. No annual party was staged this year by the association.

The LeRoy Radio Electric Company, formerly of 15 North Garfield Ave., Alhambra, Calif., has opened a new and more attractive store at 40 North Garfield Ave. In addition to the installation of special display windows Mr. LeRoy has equipped his service department with many technical devices for testing and repairing radio sets.

Edmund A. Cullen, manager of the **Denver Electrical Contractors' Association,** spent three weeks' vacation on the western coast, visiting Los Angeles, San Francisco and other California cities as well as Salt Lake City, Utah.

The "Beacon" is a newly opened electrical contracting and merchandising store in Lomita, Calif. **F. H. Bunge,** formerly of the Pan-American Oil Company, is the proprietor. The new store is located at 1324 Narbonne Ave.

The Glendale Electragists held their annual party and election of officers recently at Casa Verdugo.

First Draft of Electragist Standards Released

The Association of Electragists, International, has just issued a preliminary draft of a part of the Electragist Standards for Wiring Installations.

It is stated that the purpose of these standards is to define best practice in wiring. It is not intended that the standards shall in any way take the place of the National Electrical Code, or the Canadian Electrical Code in Canada, but rather that they shall supplement these codes by setting forth the many requirements of a quality installation which are beyond the scope of any safety code.

The present preliminary release includes sections covering purpose, definitions, types of wiring aproved under given conditions and a part of the general requirements. Sections covering engineering design and specifications for materials and apparatus and their installation are in preparation.

The preliminary draft is the work of a main committee of six of the leading contractors of the United States and Canada, assisted by the technical staff of the A.E.I. According to the procedure adopted, this and all other material prepared by the main committee will be submitted to a large technical advisory committee so elected as to be geographically representative of the entire territory of the two countries. Final action will be taken by the main committee after due consideration of reports received from the advisory committee.

While this is purely an Electragist undertaking, the committee in charge of this work states that it is its desire to secure the co-operation of all the other national bodies of the electrical industry wherever the interests of these organizations are affected.

S.E.D. Code Specialist Speaks to Industry Groups

Harry B. Kirkland, field representative of the Society for Electrical Development and head of the department of codes and ordinances, on a tour of Western states addressed meetings in the principal cities in the Pacific Coast territory on his way to the convention of the Northwest Electrical Inspectors' Association at Seattle.

At these meetings Mr. Kirkland outlined the purpose of the Society for Electrical Development and described the organization at the present time. The place of each branch of the industry in the present reorganized form of the S.E.D. was emphasized.

Describing the work of the Code and Ordinance Department of which he is the head, Mr. Kirkland pointed out a number of "horrible" examples of local ordinances or state laws governing wiring which the progress of the industry had made obsolete. The work of the society on behalf of uniformity was best exemplified, he pointed out, by the recent activity in Illinois wherein all branches of the industry were brought together for the revision of state rules and the adoption of a new ordinance for Chicago. Investigation of alleged electrical fires, to find out the true causes, was described as another activity of this department.

To Make Substandard Codes Legal

The most significant statement made by Mr. Kirkland with respect to ordinances governing the sale of substandard materials and appliances such as the Portland, Ore., ordinance, was made when he described the work of the society in this respect. In the opinion of legal counsel, police power of city or state governments could not be employed to enforce rules based upon standards established by a private organization such as the Underwriters' Laboratories. Therefore, efforts had been made to have the Underwriters' Laboratories' findings turned over to the American Engineering Standards Committee and passed upon as American Engineering standards, giving them legal standing which can be referred to as **prima facie** evidence of approved standards in case of legal controversy.

Mr. Kirkland recommended the formation of a governmental relations committee, composed of one or two representatives from each branch of the electrical industry with advisers from various parts of the state to work toward a state code and county inspection.

Portland Meeting

At an industry dinner in Portland on Jan. 23, arranged by the Portland Association of Electragists and attended by about 75 dealers, contractors, jobbers, manufacturers and central station men, Mr. Kirkland told of the Society's plans for making effective industry promotion schemes.

"Bob" Well Known in Chico

H. A. Boblett, proprietor of the Boblett Manufacturing Company, electrical contractor and fixture manufacturer of Chico, Calif.

Personals

Dr. Harold Norinder, engineer of the Royal Board of Waterfalls of Sweden, who is visiting the United States at the invitation of the Westinghouse Electric & Manufacturing Company in connection with his studies of lightning phenomena and surges, was the guest of honor at a luncheon given Jan. 17 at the Palace Hotel by **C. E. Heise,** San Francisco district manager for the Westinghouse company. **Frank G. Baum,** consulting engineer, who recently returned from Europe and who was largely instrumental in getting Dr. Norinder to come to America, was one of the speakers.

George W. Bakewell, Jr., executive manager, Electrical League of Colorado, Denver, recently attended a two-day conference of league managers in Chicago. Mr. Bakewell, who also is chairman of the N.E.L.A. Division Wiring Committee, also attended the Commercial National Section meeting while in Chicago.

William E. Whittington, district manager at Coalinga, Calif., for the Midland Counties Public Service Corporation, a subsidiary of the San Joaquin Light & Power Corporation, has resigned to enter automobile retailing in Merced. **T. K. Holmes,** formerly Mr. Whittington's assistant, has been named as his successor.

Lafayette Hanchett, president of the Utah Power & Light Company, has been chosen as one of three delegates to represent the Salt Lake City Chamber of Commerce at the next meeting of the Western division of the United States Chamber of Commerce at Honolulu, Feb. 8-9.

George Barber, Puget Sound Power & Light Company, has been named sales manager for the southern district, with headquarters in Chehalis, Wash. He is succeeded as sales manager in the northern district by **R. W. Lindley.**

J. D. McPherson, auditor on prospect construction, California Oregon Power Company, Medford, Ore., recently left that organization to join the San Diego Consolidated Gas & Electric Company.

L. L. Ellis, for the past nine years assistant chief construction engineer for the San Joaquin Light & Power Corporation, has resigned to accept a position as Fresno district sales manager for the Yosemite Portland Cement Corporation, Merced, Calif. Mr. Ellis has been associated with construction in the San Joaquin Valley since 1901, superintending construction for the Mt. Whitney Power Company on the Kaweah River, the first hydro-electric power development in that valley. He built the first concrete power house for the San Joaquin Light & Power Corporation in 1905, and has superintended building of the Kerckhoff development, the Balch plant, the San Joaquin Power office building, and many smaller structures.

California Railroad Commission Elects New President

Leon O. Whitsell, a member of the California Railroad Commission since 1925, has been elected president of that body for the year 1928, succeeding Ezra W. Decoto. The election followed the custom adopted by the members of the commission of rotating the presidency each year. Mr. Whitsell was appointed from Orange County, where he was a member of the board of supervisors and a leading figure in the citrus industry of that county. He was reappointed Jan. 1, 1927, for a full term of six years by former Governor Friend W. Richardson. Before engaging in citrus growing in southern California he was a practicing attorney for many years.

LEON O. WHITSELL

A. H. Noyes, formerly an electrical contractor and dealer in Grants Pass, Ore., and prior to that connected with the Westinghouse Electric & Manufacturing Company, has been made sales manager of the electric appliance sales department of the electrical store recently opened at Grants Pass by The California Oregon Power Company.

A. M. Frost, manager of power sales for the San Joaquin Light & Power Corporation, Fresno, Calif., was a speaker at the recent meeting of the Inter-Company Sales Committee, a group of sales executives from North American Company properties in Chicago. Mr. Frost spoke on "Rural Electrification."

W. E. Fitzpatrick, for many years connected with the sales department, San Francisco Division, Pacific Gas and Electric Company, has been appointed assistant division sales manager under **F. Talcott,** sales manager.

Philip Apfel of the Electric Heating & Manufacturing Company, Seattle, returned a short time ago from a month's visit to New York City.

H. J. Happ has been placed in charge of the newly created credit department of the Coast Valleys Gas & Electric Company, Salinas, Calif.

W. J. Grambs, Puget Sound Power & Light Company, Seattle, has been named manager of the Diamond Ice & Storage Company, a subsidiary. He will continue to be terminal manager of the Central Terminal Building in Seattle.

Harvey Hubbell, Jr., has been elected president and treasurer of Harvey Hubbell, Inc., Bridgeport, Conn., to succeed his father, the late Harvey Hubbell, Sr. For a number of years Mr. Hubbell has been associated with his father in the management of the business.

Walter Marutz has been appointed supervisor of district representatives, El Paso Electric Company, El Paso, Texas, succeeding **Thomas Thornton,** who some time ago was made merchandising manager. **J. H. Fordham** succeeds Mr. Marutz as district representative.

W. R. Bell, general superintendent of light and power, El Paso Electric Company, El Paso, Texas, has been elected president of the local Kiwanis Club.

Miss Mary Steele was unanimously re-elected chairman of the women's committee, El Paso Electric Company, El Paso, Texas, and **Miss Patricia McKee** was chosen as secretary.

George Decker, formerly superintendent of shop and offices in Alhambra, Calif., for the Southern California Edison Company, now is master mechanic in charge of all shop and repair work over that company's entire system.

Julius Hooper, president of the Rainier Electric Company, Seattle, recently spent a month in and around San Francisco.

Obituary

Col. Grant Green, head of the Visitors' Bureau, Westinghouse Electric & Manufacturing Company, East Pittsburgh, died in Wilkinsburg, Pa., Nov. 24, 1927.

Harvey Hubbell, president, Harvey Hubbell, Inc., Bridgeport, Conn., died Dec. 17 in that city. Mr. Hubbell had to his credit more than 100 patents for his inventions making for the perfection of electrical switches and sockets and machine tools.

A. L. Stadler, Graybar Electric Company, Denver, died in that city Dec. 31, 1927, as a result of injuries received in an automobile accident two months ago.

Robert Miller, district manager for the General Electric Company at Denver, died in that city Jan. 5 after quite a long illness. He was buried in West Galway, N. Y., which was his old home.

Richard J. Dibowski, secretary and director, The Wadsworth Electric Manufacturing Company, Covington, Ky., died recently in that city.

Manufacturer & Distributor

Frigidaire Regional Convention in San Francisco Feb. 11

About 600 salesmen and dealers, including a number of executives from the East, are expected to attend the regional convention to be held in San Francisco in Scottish Rite Hall, Feb. 11, by the **Frigidaire Corporation,** Dayton, Ohio, for all of its men in the eleven Western states, according to **W. L. Cochran,** Pacific Coast manager. Electrical refrigeration problems of 1928 will be discussed.

E. G. Biechler, president and general manager of the corporation, and members of the executive staff, are expected to attend the conference, which will be one of a series of eight regional meetings which will be held throughout the country.

Triangle Conduit Company, Inc., Brooklyn, N. Y., has appointed as its Pacific Coast sales manager, **C. C. Hillis,** who has been in charge of the company's office at 390 Seventh St., San Francisco. Mr. Hillis will have entire charge of the sales policy of the company on the Pacific Coast, an arrangement which makes possible the handling of questions of policy and other matters in that territory without the loss of time formerly occasioned by necessary communication with the home office, according to the company's announcement. **H. H. Manny** will continue to represent the Triangle company in Portland and Seattle and **J. J. Schaller** in Los Angeles.

The Chicago Fuse Manufacturing Company, Chicago, has announced the election of **John A. Bennan** as president and general manager. He succeeds **W. W. Merrill,** who has retired after thirty years of service with the company. Mr. Bennan, who is president of the **Jefferson Electric & Manufacturing Company,** Chicago, will retain his position with that company represented in the West by **A. W. Rockwell,** district sales representative, San Francisco, **J. A. Sines,** Los Angeles, and **L. W. Thayer,** Seattle.

The U. S. Electrical Manufacturing Company, with main offices and factory at 200 E. Slauson Ave., Los Angeles, has announced the removal of its San Francisco branch to new quarters at 236 Fremont St., where it will occupy an entire building. The additional space will enable the company to carry a much larger stock of its products with which to serve the territory north of Bakersfield, including Oregon and Washington. The San Francisco officers are: district manager — **Dodd Mauldin;** assistant to the manager— **George W. Ashlock;** office manager— **George E. Heuser. Robert Cushman** and **R. D. McCrea** are members of the sales force. The company recently enlarged its Los Angeles plant by a new building which will house the rotor department.

Banquet Ends Sales Conference of Capital Electric Co.

Seventy-five members and guests of the **Capital Electric Company,** Salt Lake City, attended the company's annual banquet which was held on the evening of Dec. 29 at the Hotel Utah. **A. C. Rees,** secretary of the Utah Associated Industries, and **H. T. Plumb,** of the General Electric Company, made addresses. **J. A. Kahn,** president of the Capital Electric Company, presided, and **B. C. J. Wheatlake,** of the General Electric Company, made the closing talk.

The banquet was the closing feature of a three-day sales conference which the company held at its offices and which was attended by its entire sales force.

Pacific Electric Manfacturing Co. Opens New Offices

The establishment of two Northwest offices by the Pacific Electric Manufacturing Company, one in Seattle and one in Portland, has been announced by **Joseph S. Thompson,** president, the genial gentleman who appears in the

center of the group shown. At the left is **C. H. Cutter,** for the past several years purchasing agent and advertising manager for the company, who will have charge of the Seattle office, 516-519 Liggett Building. At the right is **U. N. Halliday,** formerly assistant to the sales manager in the San Francisco office, who has been placed at the head of the Portland office, 1009 Bedell Building.

Intermountain Electric Co. Has Conference of Salesmen

A dinner at the Alta Club, in Salt Lake City, on the evening of Dec. 30, given by **C. B. Hawley,** general manager, brought to a close a four-day conference of salesmen of the **Intermountain Electric Company.**

The annual sales conference was conducted by **A. J. Browning,** sales manager, with representatives present from numerous manufacturers to outline latest developments in sales plans.

The Intermountain Electric Company has announced an increase in its sales force, with every expectation that the coming year will be a prosperous one.

The Refrigeration Sales Corporation is a new firm recently established in Salt Lake City, organized to sell and distribute Belding-Hall electric refrigerators in Utah, Idaho, Colorado, Wyoming and Texas. Officers of this concern are: president—**T. A. Moler;** vice-president and secretary—**Perry A. Clark;** and treasurer—**F. L. Moler.**

Allied Industries, Inc., with offices in San Francisco, Los Angeles, Oakland, Portland and Seattle, has been appointed Pacific Coast representative of the **Holfast Rubber Company** of Atlanta, Ga., manufacturers of "2-Plex" tape, which combines friction and rubber tape in one tape. Warehouse stocks will be maintained at all of the warehouses of Allied Industries, Inc.

The University Electric Company, newly organized, has opened offices in the Shirreff Building, 4534 University Way, Seattle. The firm is composed of **Ernest** and **Lionel Parsons** who formerly operated under the name of **Parsons & Parsons** in the Green Lake district.

The Apex Electric Sales Corporation, Seattle branch, has moved from 923 Pike St. to a larger establishment at 1103 Pike St. where headquarters for the State of Washington will be maintained, with **John C. Bortle** and **E. L. Neal** in charge.

Correction—Through an error it was announced in the January issue of Electrical West, in connection with an item relative to the **H.B.S. Agencies,** that **H. M. Hudson,** formerly a member of the Squires' San Francisco staff, had been placed in charge of the Seattle office. Mr. Hudson had been a member of the San Francisco force of **H. B. Squires Company,** and it is that company's Seattle branch of which he has been placed in charge.

Sandoval Sales Company, 115 Jessie St., San Francisco, has been appointed by the **Apex Manufacturing Company,** Oakland, Calif., sole distributor for its air and water heating lines in the territory of California and Nevada.

The Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has established, effective Jan. 1, Pacific Coast sales offices at 970 Folsom St., San Francisco, 229 Boyd St., Los Angeles, and 2203 First Ave., South, Seattle. The new sales district will be in charge of **Fred H. Oberschmidt**, a member of the Cutler-Hammer organization for over fifteen years. Associated with Mr. Oberschmidt at the San Francisco headquarters office will be **A. A. Tufford** and **George P. Stone. Thomas N. Bristow** will be in charge of the Seattle office, and **Edward G. Nelson** of the Los Angeles office. Complete stocks of standard items in the Cutler-Hammer line will be carried at all Pacific Coast offices.

Maydwell & Hartzell, Inc., of San Francisco and Los Angeles, Pacific Coast representative of the **James R. Kearney Corporation**, St. Louis, recently entertained **James R. Kearney**, president of that company, during his stay in Los Angeles and San Francisco en route to the Northwest where he planned to visit Portland, Spokane, Seattle and Butte. He was accompanied as far as Butte by **H. F. Hartzell**, vice-president and general manager, Maydwell & Hartzell, Inc.

F. J. Hearty & Company, San Francisco, have been appointed central and northern California representatives for **Quimby Pump Company, Inc.**, Newark, N. J. **The John G. Bell Company** of Los Angeles will continue to represent the company in southern California.

W. R. Hendrey Company, with headquarters in Seattle, has been appointed Northwest representative for the **Lapp Insulator Company, Inc.**, Le Roy, N. Y., covering the territory of Oregon and Washington, according to **S. Herbert Lanyon**, Pacific Coast representative.

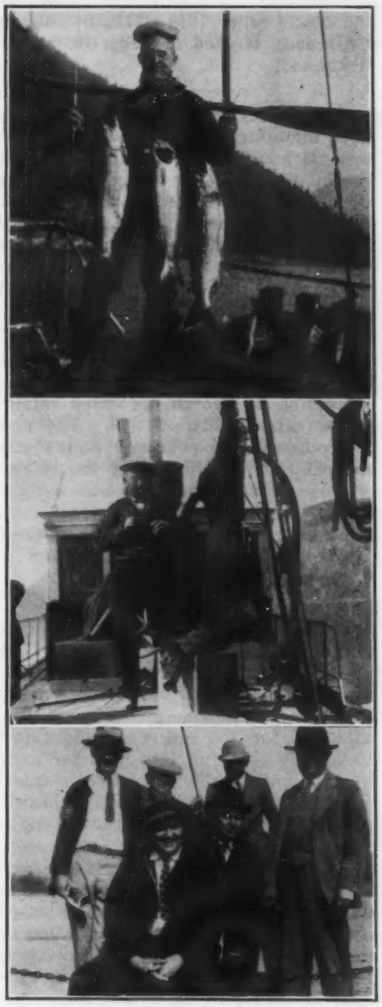
H. B. Squires Company, Seattle, Los Angeles and San Francisco, has been appointed California representative for the **Lincoln Electric Company**, Cleveland, for its line of motors. **H. F. Lintott**, Machinery Exchange Building, San Francisco, is the company's representative for welding machines.

Graybar Electric Company recently announced the appointment of **Howard W. Dye** as service and credit manager of its Denver branch.

The General Electric Company, San Francisco, announces that **E. M. Irwin** and **Charles Stoeckly** recently have been transferred to its staff from the Schenectady office.

Albert S. Knight Company, Seattle, has announced its appointment as representative of **Columbia Metal Hose Works**, Long Island City, N. Y.

When Fish Were Biting and Hunting Was Good



This merry group chartered a 65-ft. boat, with captain and crew of three, and cruised for two weeks last fall from Anacortes north in the inland waterways off the coast of British Columbia fishing and hunting. In the foreground are (left to right) H. E. Sanderson, Bryant Electric Company, and C. N. Clendening, of the National Carbon Company, both of San Francisco, and in the rear are S. W. Peterson, Stubbs Electric Company, F. N. Averill, Fobes Supply Company, both of Portland, C. R. Bach, C. R. Bach Company, and F. A. Gerhardt, Crouse-Hinds Company, both of San Francisco.

In the middle picture appears Floyd N. Averill with the buck he bagged, while above is C. N. Clendening with his catch. When Mr. Clendening is about to fish, he first "dolls up 'queer like,'" according to a member of the party. "Then as he starts to fish he goes into a sort of trance, chanting in a strange tongue. This is his way of calling the fish to him." Certainly his method or madness seems to be a successful one.

Oliver B. Lyman, Call Building, San Francisco, has been appointed central and northern California representative of the **Sundh Electric Company, Inc.**, Newark, N. J., and the **Cutter Electrical & Manufacturing Company**, Philadelphia. **The Demmert Company** of Los Angeles will continue to represent both of these companies in southern California.

Electrical Products Corporation of Colorado Builds Two Factories—Establishment in Salt Lake City of a factory to manufacture electric signs will take place at an early date as a result of the organization of the Electrical Products Corporation of Colorado. The company has taken over the Intermountain rights for the Claude Neon signs from the Electrical Products Corporation of California, which has its main factory at Los Angeles. A factory is being built in Denver for the Colorado corporation, and it is expected that the Salt Lake branch factory will be in operation early in 1928.

Edwin F. Guth Company, St. Louis, through **Leonard A. Hobbs**, Pacific Coast manager, has made public the appointment of **Hubert C. Miller** as its representative in southern California with headquarters in Los Angeles. Messrs. Hobbs and Miller, accompanied by **W. Vaughn Morgan** of Seattle, the company's Northwest representative, recently attended a sales convention at the factory.

Electric Vacuum Cleaner Company, Inc., Cleveland, has elected **Ralph B. Wilson**, formerly manager of central station sales, vice-president and general sales manager. **Harry C. Hahn**, who has been Mr. Wilson's assistant for the past several years, has been named his successor as head of the department. **L. W. Brownrigg**, 575 Mission St., San Francisco, is district manager for the company.

W. Wesley Hicks, 215 Rialto Building, San Francisco, has announced a policy of direct-to-the-trade distribution on his line of Wesix electric air and water heaters.

Pacific Coast Steel Company, San Francisco, has removed its general offices to the thirteenth floor of the Hunter Dulin Building, Montgomery at Sutter St.

Curtis Lighting, Inc., Chicago, has appointed **Thomas H. Morrison** as resident engineer to represent the firm in Denver. Mr. Morrison was formerly in the Chicago office.

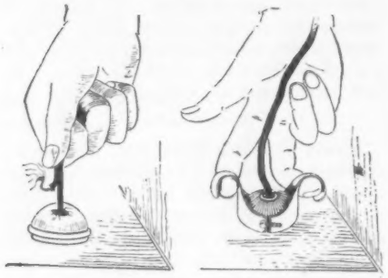
The Globe Electric Company, formerly at 311 Second Ave., South, Seattle, has removed to new quarters at 307 First Ave., South.

New Equipment

"Pull-A-Plug"

"Don't pull a wire, Pull-A-Plug." This is the slogan of the **Ren Manufacturing Company,** 1062 Main St., Winchester, Mass., maker of the useful electric attachment illustrated. Its use will prevent frayed wires, burnt-out fuses, and broken plug-caps on floor lamps, electric irons and other electric attachments, the manufacturer states, and adds:

"The Pull-A-Plug is slipped readily onto standard plug-caps of any size, style or make, and is fastened quickly



by tightening the screw. The Pull-A-Plug will not slip off. No re-wiring is necessary. The two curved arms form convenient grips for the fingers. The Pull-A-Plug also serves as a shield and protects the plub-cap from breakage. It is finished in black Japan to match the hard-rubber or composition plug."

Electric Percolator

A percolator, of both 6 and 9-cup capacity, is announced by the **Rome Manufacturing Company,** Rome, N. Y. It is made entirely of heavy virgin copper sheet, the interior heavily coated with tin, satin finished, and the exterior with a heavy covering of nickel plate polished to a high luster. The perco-

lator has a black enameled handle and three sturdy black fiber legs. A 6-ft. asbestos silk-covered cord with two-way connections and an extra fuse are supplied with each percolator. Price to the consumer $6 for the six-cup and $6.50 for the nine-cup. Sugars and creamers to match as well as 12 and 14-in. round and 16½ x 11½-in. oblong trays may be had at very little additional cost.

Heavy-Duty Soldering Lugs—These lugs, manufactured by the **H. B. Sherman Manufacturing Company,** Battle Creek, Mich., are made exactly to the specifications prepared by the N.E.L.A. to meet the insistent demand of light and power company engineers for a standardized line of properly made lugs for heavy duty, the manufacturer states.

Colored Refrigerator Cabinets—**Kelvinator,** Detroit, Mich., has brought out a line of colored decorated refrigerator cabinets, model 273. The new development, the company points out, opens up the possibility of the refrigerators being employed as supplementary to existing refrigeration as people catch the idea that one of these attractive cabinets might be fitted in other rooms than the kichen.

North Light Lenses—The North Light Corporation, 30-32 West 15th St., New York, through the **Western Glass Products Company,** 149 New Montgomery St., San Francisco, jobbers and distributors for the entire Pacific Coast area, is introducing into that territory North Light Lenses, which are designed to be used with the standard Mazda electric lamp and give true daylight quality to the light without any accentuation of any one color or shade, according to the manufacturer. Three advantages claimed for these lenses are: Comparative low percentage of absorption; no green or blue reaction from the light; slight increase in visibility or ability to see clearly under the lens rather than decrease.

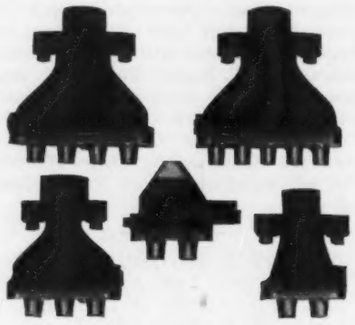
Automatic Cooker—An automatic electric cooker designed for domestic use is being marketed by the **Majestic Electric Appliance Company, Inc.,** 590 Folsom St., San Francisco. The cooker is round, with exterior finish in blue enamel and interior and utensils of aluminum with capacity of food for eight people, according to the manufacturer. The cooker is rated for 600-watt 110-volt a.c. operation. Dimensions: height 22 in.; diameter 15⅞ in.; shipping weight 46 lb. Retail price of cooker $49.50, with clock and attachments $54.50.

Wall Plates—**George Richards & Company,** 557 W. Monroe St., Chicago, who recently placed on the market their line of Hemco Bakelite wall plates, have added to it steadily until, with the recent addition of the combination duplex receptacle with single-gang toggle plate and the combination single receptacle with single-gang toggle plate, the line is now complete.

Low-Voltage Terminal

A new type of low-voltage terminal for indoor or station service recently has been placed on the market by the **Standard Underground Cable Company,** Pittsburgh, Pa.

These terminals are designed for

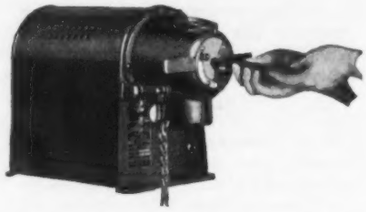


mounting on the end of pipe conduit or connecting to the sheath of a lead-covered cable by means of stuffing-box gland or plumbers' wiped joint. They are made of cast iron with Bakelite insulating tops and conductor outlets, the joints being rendered moisture-proof by liberal gaskets. They are suitable for terminating low-voltage power or control cables or similar low-potential conductors.

Wire Stripper

A new improved electric motor-driven insulated wire stripper is being introduced by the **France Manufacturing Company,** 1021-35 Berea Road, Cleveland.

This machine, which the manufacturer describes as not a new or experi-



mental device but rather the latest new improved model, is driven by a ⅛-hp. electric motor which may be plugged into the ordinary lighting socket. It may be adjusted easily to strip various sizes of wire of different forms of insulation and is designed also to remove the ends of insulated wire all ready for soldering or terminal connections. The machine is designed to strip insulated wire at a very high production rate, thereby reducing the cost of this tedious operation.

Small Reversing Switches—**The General Electric Company,** Schenectady, N. Y., announces three small switches for miscellaneous application as across-the-line reversing switches for small motors. These switches bear the designations CR 7009-F-1, F-2 and B-10.

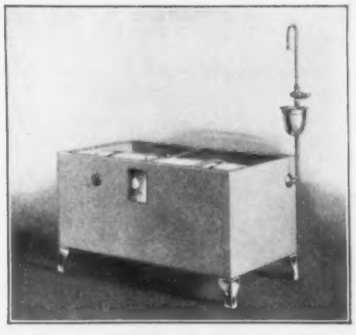
Vacuum Cleaners

Two new electric vacuum cleaners have been placed on the market by the **Electric Vacuum Cleaner Company, Inc.,** 1734 Ivanhoe Road, Cleveland. One, the "Premier Junior," is two-thirds the size and two-thirds the price of the "Premier Duplex," the so-called "parent cleaner," manufactured by this company, and the other, the "Premier Pic-Up," is one-third the size and one-third the price of the "Premier Duplex." Both are of the same high quality, efficiency and durability as the "Premier

Duplex," the manufacturer states. The "Premier Junior," designed for use in small homes, apartments and bungalows, is equipped with a ball-bearing motor and motor-driven bristle brush, and weighs 7 lb. complete. The "Premier Pic-Up" (shown in the illustration) weighs only 4 lb. and is operated like an electric iron. It can be used for cleaning automobiles, clothing, drapes, upholstered furniture, show windows, cases, shelves and the like. A long floor handle is furnished without extra charge.

Cabinet Water Heater

A cabinet water heater which will fit under any standard size oven-type range has been placed on the market by the **Automatic Electric Heater Company,** 1505 Race St., Philadelphia. The



assembly consists of an enameled cabinet of heavy-gage steel, battleship construction, containing an insulated 18-gal. storage-type water heater, with heating element of 3,000 watts, more or less, as may be required, double-throw switch, temperature indicator, control and wiring.

Recent Publications

New Bulletins of the Kearney Corporation—The following bulletins have been issued by the **James R. Kearney Corporation,** 4224 Clayton Ave., St. Louis, covering new products now being marketed by the company: No. 311, new Double Duty Fuse and Disconnect cut out; No. 312, Convertible 7.5 and 15-kv. Switching Equipment; 314, Handy Fuse Pullers; 327, C.G. Hot Tap Clamp; 328, Economy Cable Clamp; 329, "No Serve" Yokes, Splice Balls and Clevises. Copies may be obtained upon request of the company at the address given or from Maydwell & Hartzell, its distributors in Los Angeles and San Francisco.

Sterling Silvered Glass Reflectors—A 1928 pocket-size edition catalog has been issued by the **Reflector & Illuminating Company,** 1401-17 West Jackson Blvd., Chicago. This catalog supplements all previous issues and contains the complete line of the company's reflector and illuminating products.

Pacific Type MS-1 Control Mechanism for Oil Circuit Breakers of the Vertical Plunger Type—This is the title of Bulletin No. 16 issued by the **Pacific Electric Manufacturing Company,** 5815 Third St., San Francisco, covering a new type of circuit breaker control recently developed by that company.

Engine Type Direct Current Machines—Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has issued Bulletin No. 1142 under this title which describes these machines in detail and gives many illustrations.

No-Thread Fittings—The Appleton Electric Company, 1701-29 Wellington Ave., Chicago, has published a 36-page bulletin showing a complete line of No-Thread Unilets and accessories for same. Copies will be sent to all interested in this line of threadless conduit fittings.

What Engineers Found Out About Show Windows—Under this title the **Pittsburgh Reflector Company,** 304 Ross St., Pittsburgh, Pa., has prepared a booklet setting forth the results of tests "made by lighting engineers in an attempt to determine with some scientific accuracy the effect on sales caused by better lighting." The booklet contains many illustrations of window displays in large merchandising establishments throughout the United States and Canada.

Speed Reducers — Albaugh - Dover Manufacturing Company, 2100 Marshall Blvd., Chicago, has issued Bulletin A giving complete information on its high efficiency speed reducers.

"The Lighting of Schools—A Guide to Good Practice" is the self-explanatory title of booklet No. 344-A published by the **Holophane Company, Inc.,** 342 Madison Ave., New York. The booklet has been prepared for the purpose of serving as a trustworthy and convenient guide to the school architect, school board and school administration. The booklet, which is very fully illustrated, also discusses the company's engineering service which is available without obligation to school board architects and officials. Copies may be obtained by request to the company at the address given or at its San Francisco office, 74 New Montgomery St.

Electrical Laboratory Apparatus and Educational Service—This pamphlet describes a number of different laboratory machines and devices that embody the characteristics of corresponding commercial types that have been designed and manufactured for use in technical high schools and vocational schools by the **General Electric Company,** Schenectady, N. Y. The educational service of the company, including the educational courses it has instituted, also is discussed briefly.

Recording Instruments in the Power Plant—Bulletin No. 362 describes and illustrates the various types of recording instruments manufactured by **The Bristol Company,** Waterbury, Conn. A special feature of the booklet is a tabulation of applications and instrument recommendations for the power plant.

Direct Connected Turbine Generator Units.—Capacities 5, 7½, 10 and 15 Kw.—Leaflet No. 2,000-D bearing this title recently has been released by the **Westinghouse Electric & Manufacturing Company,** South Philadelphia Works. Included in the leaflet are a number of photographs showing the construction and operation of the units described, which are for 125 and 250-volt d.c. operation.

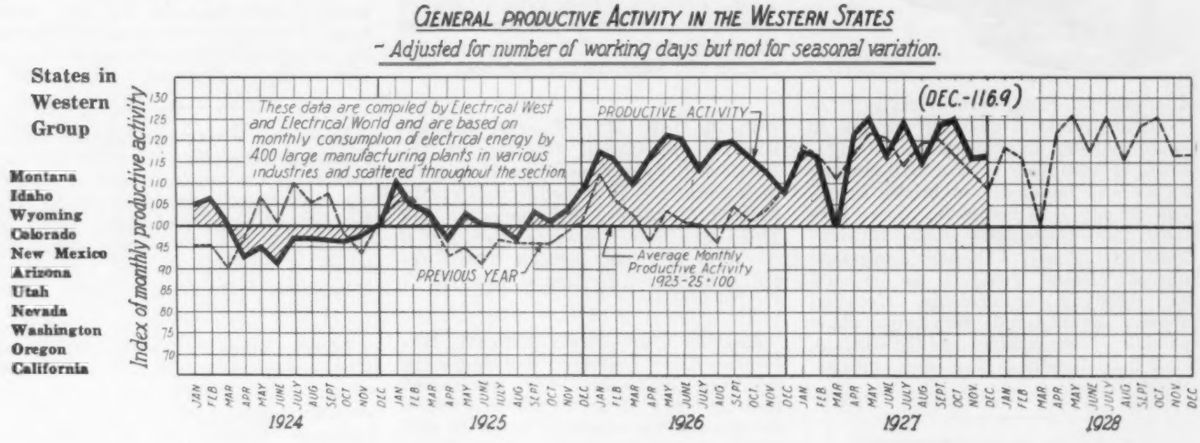
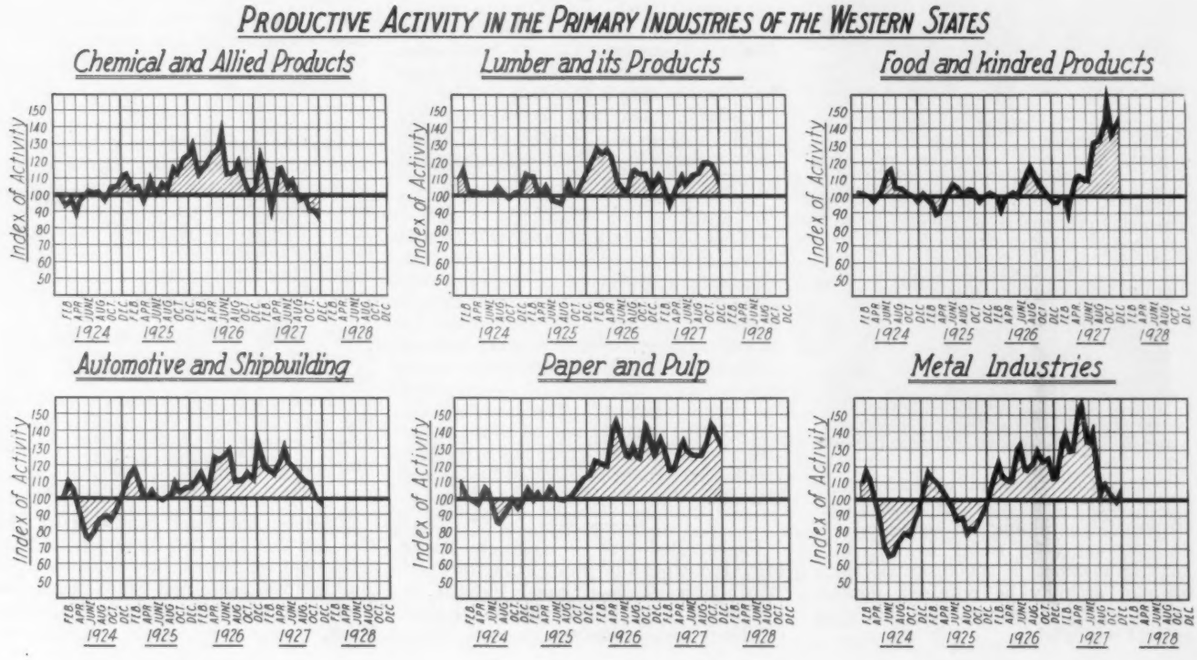
Electric Fans—Domestic catalog No. 1354 for 1928 has been issued by **The Robbins & Myers Company,** Springfield, Ohio, covering its line of electric fans for alternating and direct current circuits, non-oscillating, oscillating and ventilating fans.

Alternators—Bulletin No. 151 published by the **Ideal Electric & Manufacturing Company,** Mansfield, Ohio, gives pictorially full information concerning the six different types of alternators manufactured by the company. Copies may be obtained upon request.

Electric and Fuel Furnaces of the Car and Car-and-Roll Type for the heat treatment of metal are discussed in Bulletin 285 published by **W. S. Rockwell Company,** 50 Church St., New York.

ELECTRICAL WEST Barometer of Industrial Activity in Western States

THE YEAR 1928 opened with the manufacturing plants of the West operating on a plane about 8.2 per cent over that at the opening of 1927. This rate of annual increase in production in this section is about the rate of annual growth which has been witnessed during the past three years which is an indication that in general the manufacturing plants of the West have not been subject to the same influences which have affected general industry in the nation as a whole. Since last July the rate of operations in the rolling mills and steel plants, the metal working industry, and the automobile industry of the Eastern industrial sections have been under those of the same period 1926. These adverse conditions in these very basic industries have materially affected the rate of general operations in the nation as a whole. In the Western states, however, the influence of these industries in the general industrial structure is of comparatively less importance than in the nation as a whole, being subordinated to the influence of the operations in the food, lumber and chemical industries.

The year just closed has witnessed general industrial operations in the Western states above those of the same months in 1926 with the exception of February, March, June and August. The volume of general production during the year as a whole was about 2 per cent over that of 1926 and 15 per cent over 1925. There is every reason to believe that 1928 industrial production in the Western states will be over that of 1927, and similar conditions are expected of general industry in the nation as a whole.

The food and its products industry in the Western states has been reporting a very high rate of electrical energy consumption since last March. The peak of operations in these plants appears to have been reached in October, but the year closed with operations only slightly under those of the peak month. Electrical energy consumption figures also indicate that the rate of operations in the lumber mills of the section has also been above that of the same months of 1926 ever since June, the operations in these plants during the first half of the year being materially under those of the same period of 1926. Taking the year as a whole the volume of production in the lumber industry appears to have been about 5.6 per cent under 1926, but was 5.2 per cent over 1925. The chemicals industry, the third most influential industry of the section, appears to have been operating throughout the year on a plane under that of 1926.